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NATIONAL FIRE PROTECTION ASSOCIATION

"To Promote the Science and Improve the Methods of Fire Protection and Prevention."

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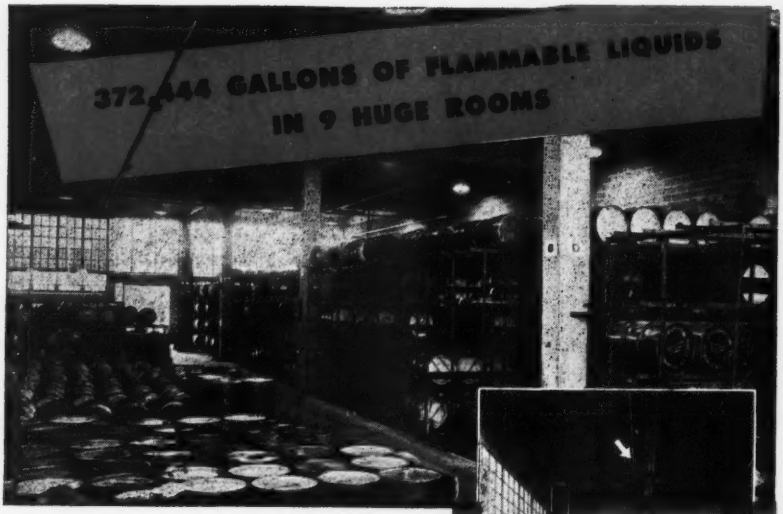

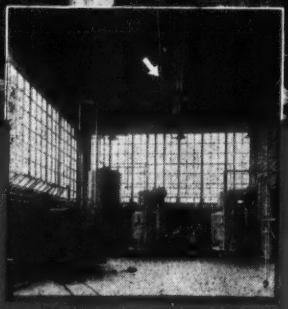

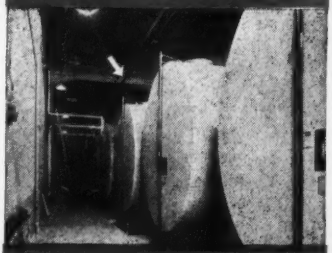

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National Board of Fire Underwriters

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This spectacular blaze occurred on the morning of Nov. 18, 1944, at New Haven, Conn., when a freight wreck upset a tank car containing 10,141 gallons of gasoline. The crash pulled down high tension wires, which ignited the flowing gasoline. Fog nozzles were used with good effect in controlling the fire.... Railroad fires, interrupting vital war transportation, are far more serious than the immediate fire loss.

The Quarterly

Vol. 38 January, 1945 No. 3

Fire Protection Developments in 1944.

By Percy Bugbee, General Manager,
National Fire Protection Association.

The preliminary estimate for the U. S. fire loss in 1944 is $423,000,000. This estimate is conservative in that it does not include a number of large losses in War Department and other U. S. government establishments that are not reported in the normal way. This loss compares with the loss in 1943 of approximately $370,000,000 and in 1942 of $310,000,000. Our prediction a year ago of a substantial increase in fire losses has therefore been borne out. There are many factors in war time that make for an increased fire loss, among which may be numbered heavy increases in concentrations of values, rapid expansion of industrial operations, necessary use of unskilled workers, inferior construction, and inadequate fire protection.

The number of fires with loss over $250,000 was 122. This compares with 105 such fires in 1943, 80 in 1942, and 48 in 1941.

There have been a few fires during 1944 which attracted great public attention. The fire in Bombay, India, on April 14, in which a munition ship exploded, may prove to be the largest individual fire loss in all history when complete information is available. Reports of the casualties and monetary damage have varied widely, with no official figures available. It appears, however, that the loss of life may have been in the neighborhood of 1000, with an additional 1000 to 2000 persons injured and an aggregate property damage in excess of $1,000,000,000. This fire was not caused by enemy action and could have been prevented.

Another fire which attracted nationwide attention was the circus fire at Hartford on July 6, which resulted in the death of 165 persons, mostly women and children. Like the Cocoanut Grove night club fire in Boston late in 1942, this fire focused the attention of municipal officials on the vital importance of making all places of public assembly safe from fire and panic. Locked exits, obstructed exits, inadequate exits, lack of automatic sprinklers where obviously necessary, flammable decorations and hangings, loose seats, needless accumulations of flammable goods or materials, promiscuous smoking in hazardous areas and other obvious factors, can all be taken care of in all places where large numbers of people congregate before and not after fire strikes. An aroused and intelligent public opinion is what is needed to see that all such places are really made safe for the men, women and children who flock to them, trusting to someone else to have made sure that at least they have a reasonable chance to get out alive after an outbreak of fire occurs.

On October 20, 1944, a series of gas explosions and fire largely destroyed the plant of the East Ohio Gas Company and an adjoining residential area in Cleveland, causing a loss of life of about 140 and a property damage that is estimated in the neighborhood of $5,000,000. This disaster involved liquefied natural gas and was a unique operation and not comparable with the storage of liquefied petroleum gases. The effect of this disaster, however, was to arouse great interest among all

municipalities in storage of gases of all character. (A preliminary report on this disaster was published in the November, 1944, NEWS LETTER.)

During the past year there was a literal epidemic of bowling alley fires, a number of which caused loss of life as well as substantial property damage. The use of highly flammable finishes for pins and for the surface of bowling alleys appears to have been an important factor here. (Articles on bowling alley fires were published in the QUARTERLY in April and July, 1944.)

Because of the large number of fires in which airplanes crashing into buildings or streets were involved, fire authorities in many cities have been forced to consider procedures for fighting such fires. The N.F.P.A. created a Committee on Aircraft Fire Fighting and is about to issue an airplane crash fire fighting manual providing full information on this important and difficult subject.

Some old and familiar fire hazards have been made acute due to war shortages. Non-flammable cleaning fluids have been scarce, and flammable types of cleaning fluids have reappeared on the market, with consequent serious life and fire hazard to people who use such materials for home dry cleaning purposes. Recently there has developed a shortage of safety matches, with consequent increase in the use of strike-anywhere matches and an increase in fire hazard along with it.

A favorable factor in the overall picture is the continued increase in general public interest in matters of fire safety. The widespread use of fire as a weapon of warfare, the number of spectacular fires that have occurred and the vital need of preventing fire loss in these days of scarcity of materials all contribute to make the public somewhat more conscious of the devastation that fire can bring if it is not properly controlled.

Because of the heavily increasing fire losses, various agencies of the federal government have taken an increasing amount of interest and attention to fire waste control. Early in 1944 the Under Secretary of War created a board on Fire Prevention to consider all matters of fire protection and fire prevention affecting War Department owned properties and war industries. The War Production Board created a Fire Protection Committee to expedite the manufacture and installation of necessary fire protection equipment for important properties. While the interest in civilian defense has necessarily continued to wane during 1944 and many civilian defense activities have been curtailed or eliminated, the Office of Civilian Defense has continued to foster and encourage the States War Inspection Service, a plan for voluntary fire inspections of industrial properties using fire insurance and other volunteer personnel under the supervision of state insurance commissioners and state fire marshals.

A problem of very considerable importance that is now looming up is the fire protection that will be provided for the immense amount of material that will be warehoused and handled by the Surplus Commodity Board.

The fire departments throughout the country have continued to suffer a serious manpower shortage and very many fire departments have been forced to operate at fires with insufficient personnel. The importance of maintaining adequate fire protection has not been fully appreciated by many selective service boards and another important factor has been the numbers of firemen leaving departments because of better opportunities at higher rates of pay in war industries and other occupations. A serious part of this situation that has not been fully appreciated has been the general tendency by many municipal fire departments to reduce fire inspection and fire prevention work and to eliminate or cut down on fire prevention bureau personnel. All of this contributes to increased fire losses.

It appears that shortages of fire apparatus that were so evident a year ago have been eased to some extent and the general situation improved during 1944, although there are still many cities that need new and modern fire fighting equipment to replace old, worn-out equipment.

Widespread interest among fire departments has been evidenced as to what is to become of the several thousand 500-gallon auxiliary fire service pumpers provided by the Office of Civilian Defense, particularly along the seaboard areas and in the

big cities. The International Association of Fire Chiefs made a survey and received replies from 450 fire departments having this OCD equipment. Of these, 302 had mounted at least a portion of their OCD equipment so as to make it serviceable for emergency use. The War Department is absorbing a considerable quantity of these auxiliary pumping units for overseas fire fighting use and the idea of using a considerable proportion of the balance for rural fire fighting in communities that do not now have fire fighting equipment seems to have met with popular favor. Cities that have mounted and are using this supplementary equipment in their fire fighting operations will undoubtedly be permitted to keep at least some of this equipment.

Fire chiefs and others interested in the fire service have appealed to the Federal Communications Commission to take steps to permit fire departments to operate independent emergency radio stations. The FCC has this matter now under consideration and it appears likely that some provision will be made to assign frequencies to at least the large municipalities.

Interest in municipal ordinances and fire regulations was stimulated during 1944 by the publication of four volumes of National Fire Codes by the National Fire Protection Association. These volumes covered (1) Flammable Liquids, Gases, Chemicals and Explosives, (2) Dust Explosions, (3) Building Construction and Equipment, and (4) Extinguishing and Alarm Equipment.

Interest in municipal building codes appears to have been revived in 1944, and many cities are now considering new codes. This interest will undoubtedly continue to increase in the post-war period when present building restrictions are relaxed. A considerable dispute has taken place in many cities as to the proper jurisdiction between city building departments and city fire departments with respect to matters of building construction and protection. The City of Detroit has recently made a contribution to the thinking on this subject in publishing a report on the proper jurisdiction for enforcement of regulations as between the building and fire departments.

New York State adopted amendments to the multiple dwelling law during 1944 in order to provide increased life safety from fire in existing lodging houses in New York City. The significant feature of this legislation (Chapter 553 of the New York State Laws of 1944) is that it is retroactive and applies to existing hazardous structures rather than being limited in application to new buildings, as is the case in many fire safety laws.

The N.F.P.A. contest for excellence in Fire Prevention Week observances by cities was participated in by hundreds of cities throughout the country, and Chicago emerged as the winner, with Memphis in second place and Jersey City in third place. In the Inter Chamber Fire Waste Contest conducted by the National Fire Waste Council of the U. S. Chamber of Commerce for year-round fire prevention activities, Hartford, Conn., won the grand award for 1943.

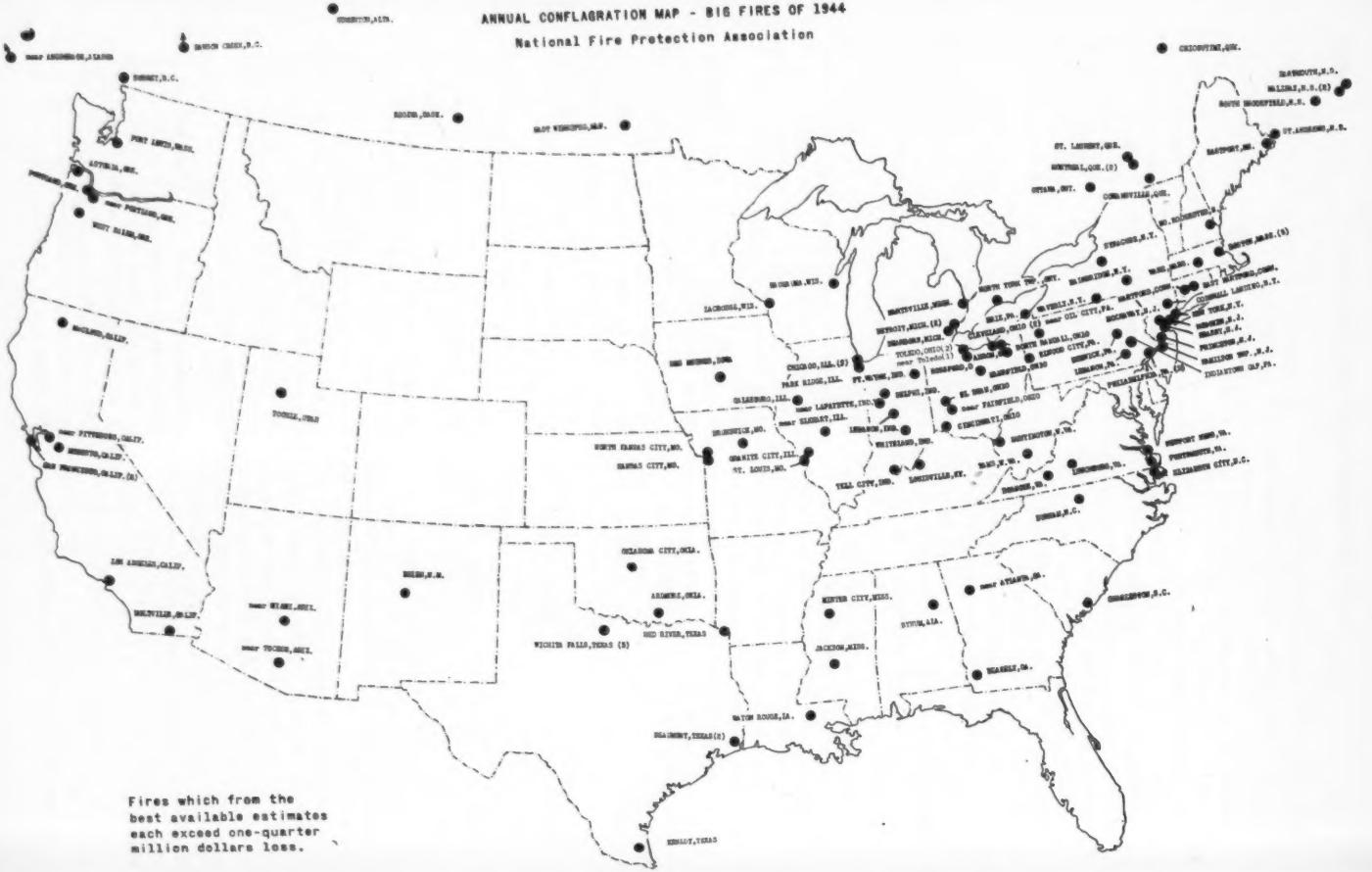
An interesting and unique fire prevention contest took place in 1944 on a year-round basis between the cities of Dallas and Houston, Texas. Great popular interest in both cities was successfully aroused and many improvements instituted of lasting benefit to both communities. The contest has been close and at this writing the winner has not been announced.

As in other fields, considerable attention is being devoted by fire authorities to the many and serious post-war problems in the field of fire administration. Every municipality should be at work preparing a long-term post-war plan for improving its fire protection services and reducing fire losses. For constructive suggestions in this field, see the report on Long Range Planning for Fire Protection that appeared in the Advance Reports of the 48th annual meeting of the N.F.P.A. published as Part II of the April, 1944, QUARTERLY.

If we are realistic enough to face the possibility that there may be future wars, then the gradual rebuilding of American cities to make them immune to the dangers of sweeping fires and conflagrations is a long-range planning problem of the utmost importance to the future welfare of our country.

ANNUAL CONFLAGRATION MAP - BIG FIRES OF 1944

National Fire Protection Association



Fires which from the best available estimates each exceed one-quarter million dollars loss.

Large Loss Fires of 1944.

There appears to be little in the following record to support any attempts to depreciate the seriousness of the losses by fire to our productive and military and naval forces. During 1944 there occurred in the United States, Canada and Alaska a total of not less than one hundred and twenty-two fires, each of which resulted in a loss of $250,000 or more. This conclusion is based upon unrestricted information received by the N.F.P.A. Department of Fire Record and is not necessarily complete. Sixteen of these fires occurred in Canada and one in Alaska. While a substantial number involved industrial plants engaged in war production, no less than eighteen destroyed property at army and navy establishments. It is often difficult and sometimes virtually impossible to obtain information about fires occurring on army and navy property due to the strict censorship that prevails. Loss information is apt to be unreliable in these cases because, since the property is not insured, it is not subject to evaluation by trained appraisers and adjusters.

The one hundred and twenty-two large loss fires of 1944 represent an increase of sixteen per cent over the number reported for 1943, and an increase of two hundred and twenty per cent during the past five years.

The following table shows the occupancies primarily involved, except where a group fire occurred:

Military and naval property	18
Warehouses	13
Metalworkers	11
Miscellaneous manufacturing	11
Woodworkers (including lumber manufacturing)	10
Mercantile properties	6
Piers and wharves	6
Flour and feed mills	4
Oil refineries	4
Shipbuilding yards	4
Department stores	3
Group fires	3
Office buildings	3
Airplane hangars (civilian)	2
Canneries	2
Cottonseed and peanut oil mills	2
Grain elevators	2
Bowling alleys	1
Circus	1
Cotton compress	1
Coal tipple	1
Dehydrating plant	1
Distillery	1
Gas works	1
Hotel	1
Ore refinery	1
Paper mill	1
Race track grandstand and clubhouse	1
Residence	1
Rubber worker	1
Salt plant	1
Ship (ferry)	1
University building	1
Wool processing plant	1
Yacht yard	1

Factors Responsible for Large Loss.

Following is an analysis of the factors responsible for the large losses. In every fire several factors contributed to the spread of the flames and the excessive loss.

	No. Times Contributing
Structural Factors	
Inferior construction, excessive areas, etc.	78
Lack of sufficient exposure protection	21
Unprotected vertical openings	17
Occupancy Factors	
Highly flammable contents, excessive amounts of burnable stock	54
Flammable liquids and gases	20
Unsafe heating equipment	6
Contents of unusually high value	6
Fire Protection	
Lack of adequate private protection	77
Lack of fire doors or cut-offs between sections	32
Fire doors blocked open or otherwise inoperative	2
Lack of adequate public protection	7
Sprinkler system shut off	6
Fire Fighting	
Fire difficult of access	10
Poor fire fighting	2
Fire department inadequately manned or equipped	6
Inexperience in fighting fires of such magnitude	8
Fire department delayed	1

Factors Responsible for Large Loss (Cont'd)

	No. Times Contributing
Delays in Giving Alarm	
Headway of fire when discovered	17
Efforts made to extinguish without giving alarm	10
Lack of public fire alarm system	2
Water Supplies	
Inadequate water supply	21
Shortage of hydrants	3
Lack of approaches to static water supply, such as river, pond, etc.	1
Weather Conditions	
Strong wind	14
Extreme cold	4
Explosions	8

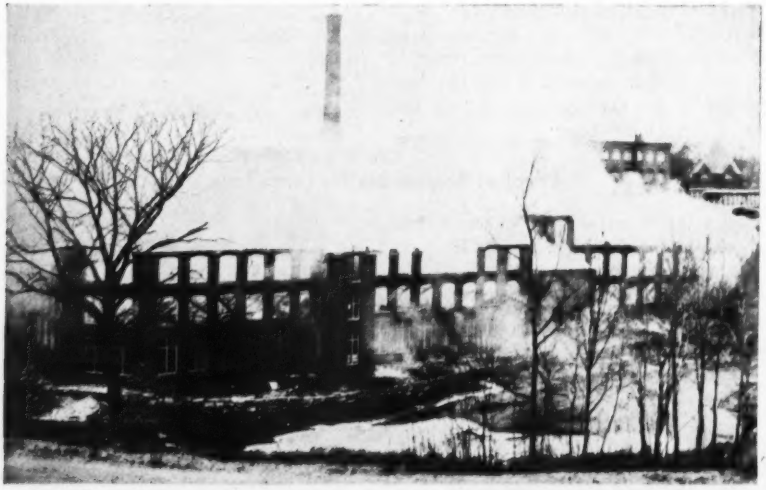
Large Loss Fires of 1944.

Jan. 3, Rossford, Ohio. Military Property. Loss not reported.

One of the larger warehouses at the Harvester War Depot, Inc. (formerly the Rossford Ordnance Depot) is reported to have been destroyed and adjacent structures damaged by fire. It is known only that the fire was described in newspapers as of major proportions, that it was discovered about midnight and that the Toledo, Perryburg and Rossford fire departments furnished assistance to the hard pressed plant brigade.

Jan. 4, Ware, Mass. Ware Industries, Inc. Loss: $976,500.

This was a very large industrial property, three-story brick plank on timber construction normally protected by automatic sprinklers. The plant was occupied by a knitting mill, dress shop, machine shop, woolen company and other tenants. The fire started on the second floor of a tenant bag shop when a workman, contrary to no-smoking rules, struck a match which ignited refuse from feed bags which had been emptied on the floor. The sprinkler system in the section where the fire originated had been frozen about ten days previously. When repairs had been made, the valve had supposedly been left open, but after the fire the valve was found closed. The valve indicator read "Open" and no water flow test had been made. Automatic sprinklers in adjoining sections operated, but the water supply was inadequate to serve both the sprinklers and the mill yard hydrants used by the fire department to supply hose streams. Effective fire fighting was handicapped by the location of a large portion of the plant in a bend of the Ware River and thus accessible only on the exposed side facing the building in which the fire started. After five hours' pumping one of the local pumpers, which was 21 years old, broke down. About this time sparks carried by the very high wind ignited a large mansion some 3000 feet distant across the river, resulting in a $20,000 loss. Nine outside fire departments were called and the fire was finally



International.

A large industrial loss at Ware, Mass., on January 4, 1944. An inadequate water supply plus a closed sprinkler valve gave the fire a chance to get in its deadly work.

extinguished the next day. Several other exposed buildings were saved. The total loss from this fire has been placed at approximately $967,500, of which approximately $310,000 was fire damage and rent loss to the Ware Industries, Inc. The balance was loss suffered by some eight tenants and the loss to the mansion that was ignited by flying brands. Also included in the loss figure was some $125,000 use and occupancy loss. (See April, 1944, QUARTERLY, page 300.)

This two million dollar fire at Marysville, Mich., on January 10, 1944, was due to poor construction without sprinklers.

Jan. 10, Marysville, Mich. Morton Salt Co. Loss: $2,000,000.

This plant, said to be the largest salt manufacturing plant in the country, was 45 years old. The buildings were largely frame and corrugated iron, closely grouped and without automatic sprinklers. It was about three quarters destroyed; a small area of fire-resistive construction prevented spread of the fire in one direction. Fire originated in a dry kiln used for drying barrel staves, due to wood refuse in contact with steam pipes. The fire department was called at the first indication of smoke, but was shorthanded owing to war conditions, and with a 45 m.p.h. wind, and some delay in securing an adequate water supply for pumpers, was unable to prevent the spread of the fire despite aid summoned from several near-by communities.

Jan. 12, Toledo, Ohio. Business Block. Loss: $503,200.

This property was a one-story tenant mercantile block of brick-joist construction. Areas occupied by individual tenants were subdivided by combustible partitions and the fire spread through open roof space. Ceilings were likewise reportedly of combustible construction. This building had been erected in 1940 and was in compliance with the obsolete building code requirements then in effect. There were no fire walls, or automatic sprinklers. Fire occurred at 4:27 A.M. while employees of the Colony Block alleys were refinishing bowling pins. It is believed that a spark from emery cloth held against the pins on the lathe ignited fumes from alcohol and naphtha solutions used to clean pins. One of the workmen ran to a near-by fire station to give the alarm. When the firemen arrived, flames had spread through the combustible partitions into the open roof space above, seriously involving six of the tenant mercantiles. The fire department experienced considerable difficulty in combating the fire, due to extensive use of "some sort of corrugated paper insulation in stores to deaden sound of bowling alleys." Firemen reported that when they pulled this material away the intense flames burst forth. Sixteen fire companies were employed in fighting the fire, which cost the life of one fireman when he was trapped by a heavy concrete slab following an explosion. Twelve other firemen were injured, several severely.

Jan. 20, near Atlanta, Ga. Military Property. Loss: over $2,000,000.

Fire originating during the early morning hours destroyed the base repair shop and part of a warehouse at the Atlanta Ordnance Depot. It is understood that the repair shop building was 248,000 sq. ft. in area, and had neither fire walls nor sprinkler protection. The building was one story, with a maximum height of 50 ft. and had brick walls and a wood timber roof. The fire spread across a 100 ft. space to a warehouse of smaller size. It is said that reflection from the fire was visible in downtown Atlanta, ten miles away. Firemen from Atlanta, Hapeville and the Army Depot fought the fire. The loss figure released for publication was $2,000,000 to $2,500,000.

Jan. 20, Toledo, Ohio. Mercantiles. Loss: $254,000.

A police officer passing by a 5-story brick auto accessory retail store and warehouse shortly after midnight, discovered a fire which originated in the rear of this building and had already gained great headway. When firemen arrived, the fire had ignited a 3-story brick building across the street occupied as a laboratory, and also ignited other near-by structures. The bursting of drums of oil added to the intensity of the fire. The fire department responded to four alarms and two special calls for extra equipment and finally brought the fire under control after the building in which it originated and the adjacent 5-story brick building housing a men's clothing store had been completely destroyed and other near-by buildings had been considerably damaged. The factors responsible for the large loss are lack of automatic sprinkler protection in large mercantile buildings of combustible construction; serious headway of

A damaging war supply loss occurred in this ordnance depot in Detroit on January 24, 1944. Unprotected frame warehouses are not suitable for storing valuable supplies.

the fire before it was discovered from the outside; lack of automatic fire alarm or watchman service and lack of exposure protection on buildings across the street. Loss $254,000.

Jan. 22, East Hartford, Conn. Landing Barge Manufacturer. Loss: $400,000.

Fire of suspicious origin destroyed the plant of the Campagna Construction Co. making freight barges for the federal government. A watchman was supposed to be on duty and claimed to have gone to the boiler room to check the boiler. He found the entire plant on fire when he came out. The plant consists of a large cinder block building and a line of old tobacco sheds where lumber was stored. Twenty completed barges crated for shipment were not reached by the flames, which destroyed more than 1,000,000 board feet of lumber. Four fire companies fought the blaze but were handicapped by 4-in. water mains. The fire chief stated that the plant was well provided with small fire extinguishers and "kept a clean shop." The burning out of a door between a frame storage building of the main work shop allowed the fire to get into the large open shop. Town assessment records place the loss on building and contents at $64,000, but this does not include the loss to lumber and barges owned by the government. Early newspaper estimates reported the total loss $750,000, which is probably high. The fire department confirms a later estimate of $400,000 loss.

Jan. 24, Detroit, Mich. Military Property. Loss: $2,000,000.

Fire at the Fort Wayne Ordnance Depot which started in a boiler room in an unprotected frame warehouse destroyed three such warehouses containing automotive parts which constituted a reserve supply being built up in anticipation of military needs in the war theatres. Fire was discovered by several workmen at 7:00 A.M. when they opened the warehouse. The Detroit Fire Department responded to five alarms with 22 fire companies and a fire boat and used 35 lines of hose. A Coast Guard boat also assisted in fighting this fire. A brisk wind is said to have contributed to the spread of the fire to the exposed warehouse. The warehouse in which the fire started was 100 ft. by 75 ft. in area and was of one-story and basement construction. The exposed warehouses were of somewhat smaller size. The loss figure released for publication is $2,000,000.

Jan. 25, Holtville, Calif. Group fire. Loss: $400,000.

Half a block in the main business district of this city was destroyed by a fire which cut off telephone communication throughout the community and caused damage estimated at $400,000. The fire started from a trash heap at the rear of a café. A strong wind fanned the flames into the café and from there the fire spread through a hardware store, a hotel, a dry goods store, a drug store, the local telephone exchange

and a beauty shop. The nature of the construction involved was not reported. Fire companies from El Centro, Brawley and the Holtville Marine Station aided local fire fighters.

Feb. 1, Bainbridge, N. Y. Casein Co. of America. Loss: $350,000.

Fire in this casein manufacturing plant started in the drying department at the rear of a one-story brick-joist building and the first alarm was given from the outside at 5:30 P.M. The watchman had completed his first round at the time the fire was discovered. The cause of the fire is unknown, but is believed due to spontaneous ignition. No welding equipment or other source of sparks or open flames had been used prior to the fire. This building was not sprinklered. The factory contained two fire lines with hose on each floor, but it was impossible to use these, as one was directly in the path of the flames and could not be reached, while the other would have been reached only at great danger because of the nature of the fire. The volunteer fire department employed four engine companies and used six hose streams to confine the fire to the building involved. The water supply was not adequate at the start of the fire, as the nearest main was of only four-inch size. Plant superintendent estimates the loss at between $300,000 and $400,000. It is reported that the plant housekeeping and maintenance of fire equipment was generally good, although the premises were rather crowded under current manufacturing conditions.

Feb. 2, Portland, Ore. Iron Fireman Mfg. Co. Loss: $3,000,000.

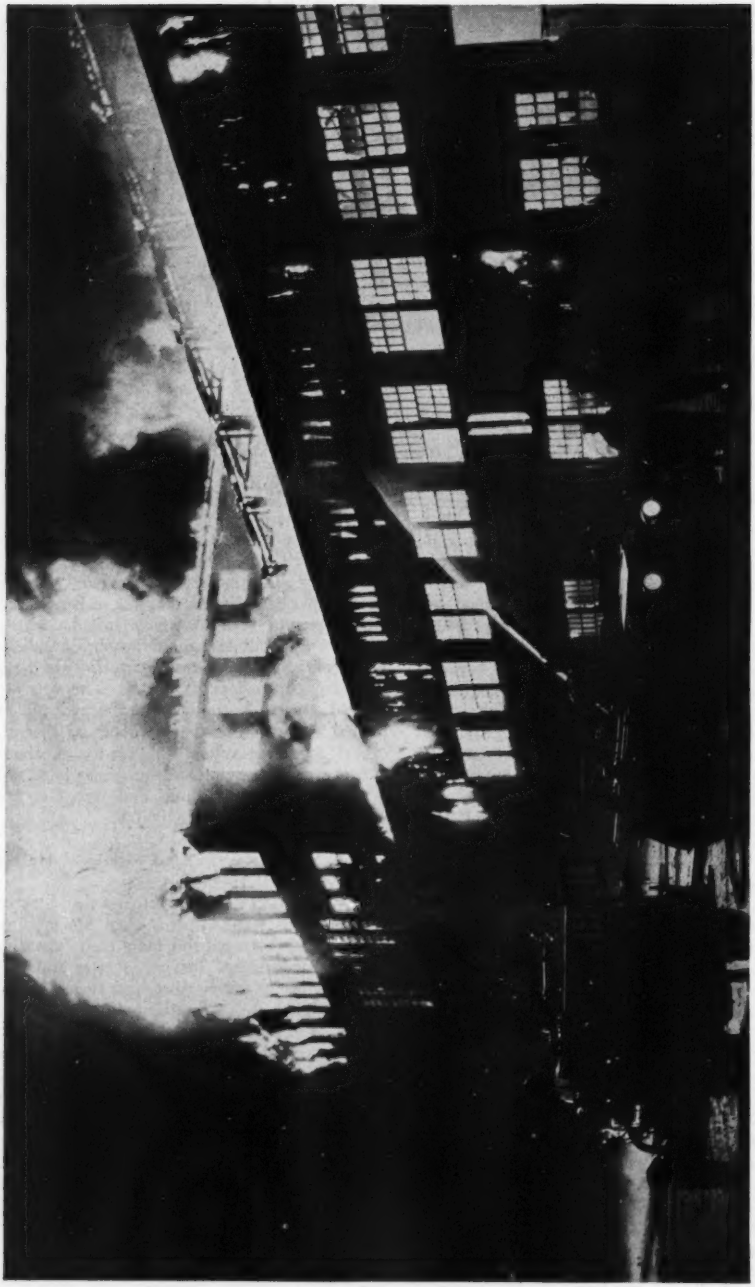
This plant was engaged in the manufacture of engines for Liberty ships under contract with the U. S. Maritime Commission. Large areas of frame and brick-joisted construction without fire cut-offs permitted a fire that was comparatively small when discovered to sweep through several major sections of the plant with extreme rapidity. Powerful public fire department forces that were quickly on the scene were powerless against the fire conditions resulting from deficiencies in private protection, but did excellent work in saving other large plant areas that were seriously exposed. Fire started under the wooden basement of an old frame building remodeled for use as a carpenter shop. Beneath the floor was a steam pipe which was in contact with a considerable amount of old lumber and trash. About 6:00 P.M. employees noticed smoke coming through the floor. Several men tore up flooring and entered the underfloor space with a chemical extinguisher. At this time the fire was "about the size of a bushel basket," but was out of reach. One of the men then telephoned to the fire department and another man sounded an alarm from Central Station fire alarm box. The plant was equipped with an automatic fire alarm system, but there was no alarm tubing in this underfloor space because it was understood that the entire floor rested on earth fill, which was true of most of the flooring on the basement level. The plant including newly erected sections was of flimsy construction, largely frame, without proper cutoffs between sections, and not provided with automatic sprinklers. The fire was fought by 14 engine, 3 hose, 3 ladder, and 2 fire boat companies, employing a total of 34 streams, including five turret nozzles. Fire department places the loss at $1,222,741. Loss including interruption to production $3,000,000. (See April, 1944, QUARTERLY, page 303.)

Feb. 8, North York Twp., Ontario. Airplane Hangars. Loss: $350,000.

Fire discovered by the night watchman in the furnace room destroyed 2 hangars and repair shops operated by Leavens Bros. at Barker Air Field. It was reported that at least 35 R.C.A.F. training craft were destroyed. The fire occurred shortly after the watchman had tended the furnace and it is believed that hot ashes placed on the cement floor may have rolled under a crack in the wall and ignited wood studding. Fire fighters from several departments were handicapped by lack of water. The fire destroyed several buildings and burned planes parked outside. Newspapers reported that an expert appraiser valued the planes at about $7000 each, or a total of approximately $250,000. Damage to buildings and repair equipment probably exceeded $100,000.

Feb. 8, near Lafayette, Ind. National Homes Corp. Loss: $420,000.

Three workmen lost their lives and three other persons were injured when fire starting at 9:40 P.M. destroyed this plant manufacturing prefabricated houses for use at war industry centers. The plant consisted of several large unsprinklered frame buildings, one story in height. Completely assembled houses, 24 ft. square, were being sprayed in a booth 27 x 23 ft. While the lighting of the booth was apparently standard, it appears that portable lights were used while spraying the interior of the house. A light bulb broke and the naphtha thinned paint flashed. One of the men in the booth ran out through the factory, his clothing ablaze, spreading fire. Three workmen lost their lives when they became confused and did not leave promptly. Several others were injured. Plant was outside city limits, with nearest hydrant 800 ft. distant. Early estimates of loss by



Engines for Liberty ships were being made in this Portland, Oregon, war plant, which fire destroyed on February 2, 1944. Large areas without adequate cut-offs turned a small fire into a big one.

Lumber yards are often a headache to the fire department. This one at Dearborn, Michigan, was a total loss on February 12, 1944.

insurance adjusters are $220,000 property damage and $200,000 use and occupancy.

Feb. 12, Dearborn, Mich. Lumber Yards. Loss: $500,000.

High winds and zero weather, together with a large area of combustible materials subject to destruction by a single fire, were leading factors in a rapidly spreading blaze which started in the boiler room of the Smith-Orr lumber yard and engulfed the entire yard, lumber mill, shed filled with delivery trucks and spread to the exposed lumber yard and buildings of the Berg-Patterson and Buck Lumber Co., which were likewise completely destroyed. A large Army Air Forces warehouse was seriously threatened with destruction. The first alarm was received at 10:10 P.M. The initial fire department response appeared to be chiefly one pumper, one ladder truck and a rescue company. Additional alarms brought five pumper and hose companies and three ladder companies of the Dearborn Fire Department. Not until twenty minutes after the fire was discovered did the first call go to the powerful Detroit Fire Department, which answered this call with three engines and subsequently sent five more engines on request. Sprinklers inside the Army warehouse operated and these, combined with a water curtain thrown up by eight pumpers assigned to protect that important exposure, saved the structure. The fire was caused either by hot ashes from the stove, which are known to have been placed on the floor, or from a defective stoker which had not been operating properly. Exact losses from the fire are not available, but the best estimates place the damage at between $500,000 and $1,000,000.

Feb. 12, El Dean, Ohio. Aultman Mills. Loss: $275,000.

It is believed that this fire, which destroyed flour and grain mill buildings and their contents, was due to improper wiring and that its spread was the result of poor housekeeping. It is stated that a very great portion of the insurance had been cancelled shortly before the fire because of unsatisfactory conditions at the plant. The fire was discovered by the night engineer and watchman at 2:00 A.M., and was then confined to the fourth floor, but fire had enveloped the entire building and spread to adjoining buildings by the time fire companies arrived from Troy and Piqua, Ohio. The Troy Fire Department had responded to previous fires in this plant that were definitely of electrical origin and reported that the wiring was in very poor condition. Loss was $100,000 to contents and $150,000 to $175,000 to buildings and equipment.

A similar fire under the same management occurred in July, 1943, at Irwin, Pa., and resulted in a $250,000 loss, which was likewise not covered by insurance.

Feb. 13, Mansfield, Ohio. Mercantile Block. Loss: $327,450.

Fire presumed due to careless smoking apparently started in the dressing room of a night club on the second floor of this old 3-story brick-joisted mercantile known as the Cummins Building. Fire extended through the building and to the Newman Building, a similar structure in the rear, and also did substantial damage to a furniture company building adjoining. The fire was discovered during the early morning by boys who were passing by.

They stopped a police cruising car and the police sent in the alarm. The night club janitor had left the premises forty minutes before the fire without observing anything wrong. At the time the alarm was received, two of the four fire department pumpers and ladder trucks were at another fire. Fifty minutes after the first alarm two other cities were called upon for aid. Fifteen hose streams were used to fight the fire, but more than two hours later fire broke through party walls into the furniture store building and extended through the roof. This fire well illustrates the fact that the average small fire department is too small and undermanned to successfully cope with a major fire in congested areas of unsprinklered combustible mercantile buildings. While party walls assisted in checking the spread of the fire to the west, they failed to stop the spread of the fire eastward. The fire department reported that the fire spread through an underpass connecting various business buildings involved. While the off-shift firemen happened to be in the station and responded with the apparatus, the equipment was still seriously undermanned, as the normal fire company strength in Mansfield is only two men per company.

Feb. 13, Huntington, W. Va. Stores and Office Building. Loss: $335,000.

An early morning fire, which was burning for some time in the two-story unsprinklered brick-joisted Miller-Ritter building before it was discovered, resulted in total loss to this property and damage to near-by buildings. It was discovered by a newsboy who telephoned an alarm, but was seriously out of control when firemen arrived. Nine hose streams, including two turret nozzles, were used in an effort to control the spread of the fire. However, the 4-story building across an alley to the rear suffered considerable damage. This large loss is directly attributable to excessive area of ordinary joisted construction without automatic sprinkler protection or brick division walls. Initial fire fighting efforts were delayed, as the first firemen were trapped under a falling balcony at the front of the room in which the fire occurred. A heavy iron safe had been installed on the balcony. The fact that the building across the alley had automatic sprinkler protection saved this from complete destruction. The loss figure includes building and rent insurance loss amounting to $135,000 and contents loss of approximately $200,000.

Feb. 18, No. Kansas City, Mo. Larabee Flour Mills Co. Loss: $1,000,000.

Four men lost their lives and 22 were injured when a dust explosion of unknown origin wrecked portions of the central sections of this plant. While the building was of fire-resistive construction, the dust collecting facilities were inadequate, ventilation was poor, and self-releasing vents were not provided. Heavy damage to the structures was due primarily to the solidity of the structures themselves. Sections most seriously involved included the elevator and cleaning section of the mill. Numerous sporadic fires followed the blast. Due to a serious manpower shortage in the fire department and difficulty in reaching the seat of the fire in sacked flour, bran, and empty bags in bales, the fire burned and smoldered for over 80 hours.

Feb. 19, Tell City, Ind. Tell City Furniture Co. Loss: $252,000.

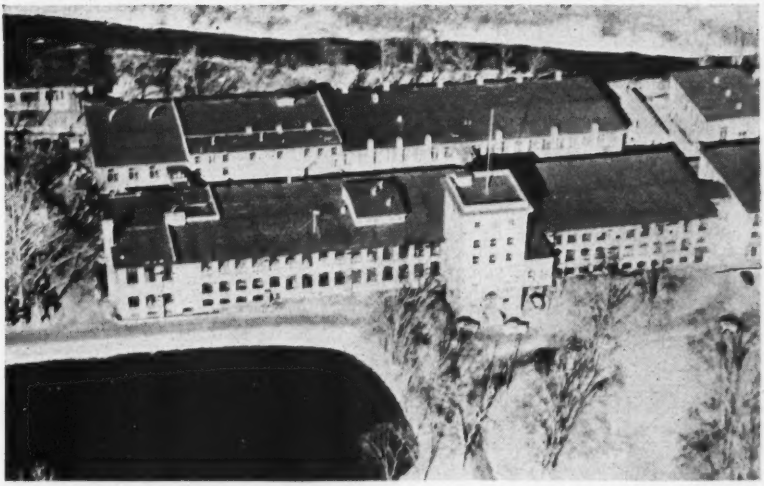
This was a large furniture manufacturing plant which was devoting approximately 60% of its facilities to war production. Buildings were mostly three-story brick-joisted construction. The fire started in a veneer room and was seen by a workman a block away, who telephoned the alarm. The plant was equipped with automatic sprinklers, but it is believed that delayed action of the obsolete 1907 dry pipe valve, the exhauster for which had been shut off, may have been responsible for failure of the sprinklers to extinguish the fire in this section. The local volunteer fire department with outside help used eight hose streams and held the fire to the one section. Automatic fire doors protecting communicating openings in the fire walls closed properly.

Feb. 29, Kaukauna, Wis. Sangamon Paper Mills. Loss: $340,000.

This plant was engaged in converting waste paper into wrapping paper and contained considerable storage of waste paper in piles. The plant was of three-story ordinary joisted construction. The alarm was telephoned by an employee at 4 P.M. The fire, believed due to an overheated bearing, was beyond control when firemen arrived. Outside help was called and seven hose streams were used to protect surrounding buildings, including a large power plant adjoining the paper mill. Reasons for failure of sprinklers to control this fire include the unusual concentrations of waste paper, unprotected belt openings in floor, insufficient water supply and slow operation of dry valve. Loss estimated at about $300,000, including use and occupancy loss.

Mar. 2, Eastport, Maine. Naval Construction Training Center. Loss: $400,000.

Fire of unknown origin discovered at 2 A.M. destroyed the frame Administration Building of Camp Lee Stephenson. This was formerly the Administration Building of Quoddy Village.



This heavily overloaded Lease-Lend warehouse at Rockaway, N. J., was destroyed with large loss on March 6, 1944.

A fifty-mile-an-hour gale carried the flames through the long open corridor of the building which covered an area of 44,000 square feet. The private fire brigade and city fire department were unable to do very much, as the entire building was involved. Flames spread to a print shop and to a farm across the road. Government property valued at some $400,000 was destroyed.

Mar. 5, Halifax, N. S. Pier Fire. Loss: $400,000.

This large loss involving a pier shed of supposedly superior construction is perhaps one of the best illustrations that could be found of the fact that most large loss fires are the result of a combination of many relatively small failures of management, whether public or private, and of fire protection facilities. Although the fire was discovered relatively early by the guard on duty at the pier, the alarm was not given promptly and unprotected fire wall openings permitted rapid extension of the fire. Competent investigation of this fire enumerated many details contributing to the loss which undoubtedly are more or less typical of unrevealed circumstances at other large loss fires. Some of these factors are listed below: No alarm given when smoke was first seen. Fire fought by workmen before turning in city alarm. Private standpipe and hose inoperative. Hydrants frozen. Unprotected openings throughout pier shed. Poor maintenance of fire pumps. No sprinkler protection. No coördination between seven fire departments in the port area.

Mar. 6, Rockaway, N. J. Lend-Lease Warehouse. Loss: $11,000,000.

An old mill building was leased to the Treasury Department for storage purposes. The building, about 300 feet long and 80 feet wide, two-story and basement, brick and timber construction, was loaded with millions of pairs of shoes, a large quantity of blankets and other materials. The storage was increased until the goods were packed solidly up to the level of the ceiling beams, with very meager aisle space left. Under this load the floors in one section began to sag and the wall bulged out. The wall was shored with braces, but the contents were not removed. Fearing that the sagging floors would cause rupture of sprinkler pipes, the water was shut off. The sagging floors apparently caused a short-circuit in electric wiring. Watchmen smelled burning insulation throughout the night, but did not see any fire and apparently did not cut off the electric current. When employees opened the doors shortly before 8:00 A.M. the entire section burst into flames. The local fire department was immediately called and help was summoned from other fire departments over a large area. The fire, however, was inaccessible for fire fighting, owing to the dense piling, and spread upwards through holes that had been cut in the floors and to other sections through fire walls where fire doors had not been properly maintained. The fire burned with great intensity for more than a week. Fire fighting efforts were concen-

trated on protecting an adjoining similar warehouse forty feet away, which was saved. Loss estimated at $11,000,000.

Mar. 7, Detroit, Mich. Automotive Pattern Works Co. Loss: $400,000.

The second and third floors of this brick-joisted building were occupied by a pattern company and the first floor by a rug concern. Fire was discovered on the second floor by employees at 10:38 P.M. Apparently a spark from an old chimney opening ignited open area between the ceiling of the first floor and the flooring of the second. The building was without automatic sprinkler protection and this fact, coupled with the lack of cut-offs between sections and the concealed open areas, resulted in the destruction of half the building. The large monetary loss is due primarily to the high value placed on the patterns which were destroyed or damaged.

Mar. 8, Lynchburg, Va. Storage Warehouse. Loss: $290,000.

Explosion of gasoline fumes resulted in the virtual destruction of the brick and timber warehouse of the Gilbert Storage & Transfer Co., together with its contents. The warehouse contained household furniture and goods, much of which was stored by servicemen "for the duration" and a considerable amount of wood pulp. A gasoline tank truck, parked in a driveway which extended into the building, was left unattended while gasoline was being delivered to a tank under the basement floor. The explosion was presumably due to ignition of gasoline vapors by a furnace. Fire spread rapidly throughout this four-story brick sprinklered building by means of an unprotected elevator shaft. A portion of the sprinkler system on the lower floors at least was wrecked by the explosion, allowing the fire to spread unchecked and overwhelm the remaining sprinkler facilities.

This fire again illustrates the inherent danger of interior gasoline filling connections, which are contrary to the provisions of the N.F.P.A. Suggested Flammable Liquids Ordinance. A similar fire was reported in the April, 1942, QUARTERLY and the statement made that such connections to gasoline tanks "constitute so severe a hazard that no oil distributor should permit its trucks to use them. Refusal to fill gasoline tanks through inside connections would soon result in their elimination."

Mar. 14, Chicoutimi, Que. Group fire. Loss: $302,260.

Fire of undetermined origin destroyed a number of stores, tenements and other properties. Volunteer firemen, aided by neighboring fire departments and personnel from a near-by military establishment, fought the fire with 15 hose streams. The spread of the fire in one direction was stopped when it reached the large sprinklered property of J. B. Renaud & Co. Some 7 buildings were reported totally destroyed, including approximately 20 stores and tenements. Approximately a dozen other properties suffered from smoke and water damage.

Mar. 18, Indiantown Gap, Pa. Military Property. Loss: $500,000.

The Indiantown Gap military post laundry was completely destroyed by fire, along with many bundles of clothing. The fire was fought by the post fire brigade, but they were unable to check the blaze. No details of the fire have been released by the military authorities. Loss estimated by newspapers at $500,000.

Mar. 27, Fort Wayne, Ind. Sears, Roebuck & Co. Loss: $305,000.

Fire of uncertain origin, which started in the attic of this four-story building, resulted in the destruction of the roof, attic and part of the fourth floor. The lower floors of this brick and hollow tile building were of reinforced concrete, but the fourth floor ceiling (attic floor) and roof were of ordinary joisted construction. There were no automatic sprinklers. The fire was discovered by an employee and the alarm was transmitted to the fire department by telephone. The attic space, used as a stock room, was thoroughly involved when the fire department arrived and before they could get hose lines to the roof, it collapsed. Two weeks after the fire, as plans for reconstruction were being made, part of the walls still standing collapsed onto an adjacent building, killing six persons and causing damage and business interruption.

Apr. 1, San Francisco, Calif. San Francisco Warehouse Co. Loss: $750,000.

A lighted match dropped by an employee in bales of cotton started a fire on the third floor of this unsprinklered four-story brick warehouse. Fire doors were effective in keeping the fire within the north section of this building, but unprotected vertical openings allowed it to spread to the fourth floor and roof. Iron shutters on some windows made access to building difficult for firemen. Failure to segregate various types of storage played a major part in this large loss. Due to the fact that the uninsured Government-owned cotton from this warehouse is still being sold throughout the country the loss figure may be subject to some correction.

Apr. 2, Astoria, Ore. Navy Hangar. Loss: $300,000.

An unsprinklered wooden hangar and an undisclosed number of Navy combat planes were

International.

A warehouse in San Francisco was badly damaged in this fire of April 1, 1944. Unprotected vertical openings and lack of automatic sprinklers were important factors.

destroyed by a fire which was discovered shortly after 6 A.M. in one of the shop rooms at the Naval Auxiliary Air Facility, Clatsop County Airport. Fed by gasoline and oil, the fire destroyed the large building in an hour. A second hangar near by would also have been destroyed in all probability, but for the unusual absence of wind at the time of the fire. The fire was fought by fire fighting crews from Fort Stevens, the United States Naval Air Station at Astoria, and the City of Astoria. One man was reported injured by burning ammunition. The loss figure released for publication is $300,000.

Apr. 5, San Francisco, Calif. Government Warehouse. Loss: $375,000.

This single story frame cold storage warehouse was practically completed in its exterior construction when fire virtually destroyed the structure. The warehouse was being built under the auspices of the Federal Government as a unit of a U. S. Government Warehousing Project. It was to be turned over to the military or naval forces upon completion, according to reports. At the time the fire occurred, insulation was being installed in the floor of one of the cold storage compartments. This floor insulation consisted of 6-inch and 8-inch corkboard set in and sealed with tar. The fire resulted when overheated tar ignited as it was being poured over the corkboard floor surface. Spread of the flames was exceedingly rapid and the workmen barely escaped with their lives. On arrival the fire department found the building practically enveloped in flames. The building had an area of 125,200 sq. ft. subdivided into four unequal areas by frame partitions faced with one-half inch sheetrock. Communications in these walls were unprotected at the time of the fire. These buildings were erected despite the objections of the San Francisco Fire Department to their size and type of construction.

This Oklahoma storage warehouse fire, April 19, 1944, caused a loss of over $500,000, destroying the property of 2000 individual owners. Fire, caused by lightning, was controlled by automatic sprinklers. The sprinklers were then shut off to prevent water damage. The fire rekindled and before sprinklers could be turned on it spread beyond control.

Apr. 7, Edmonton, Alberta. Military Property. Loss: $500,000.

Newspapers report a fire in a heavy equipment repair shop of the Northwestern Division, U. S. Army Engineers, which destroyed many motor vehicles, office equipment and records. The fire is said to have started when fumes of spilled gasoline ignited. Further details are lacking. Loss estimated at $500,000.

Apr. 8, Elizabeth City, N. C. Foreman-Derrickson Veneer Co., Inc. Loss: $470,000.

Fire of undetermined origin occurred in a veneer drier and spread from the machine through open ends and side panels which had been removed for clearing of choked material. Automatic sprinklers in the drier and in the frame metal-clad building operated, but owing to an inadequate water supply were not effective in controlling fire in this highly combustible occupancy. It is believed also that a layer of veneer lodged on the top set of conveyor rolls inside the drier prevented sprinklers inside the machine from fusing immediately and then prevented water from reaching the seat of the fire while still confined to the drier. Employees fought the flames with a hand extinguisher and a hose line from a private hydrant before calling the local fire department. This resulted in a delay of nearly 15 minutes between the discovery of the fire and the receipt of the telephone alarm by the fire department. It is reported that fire fighting efforts lacked coördination in attacking the fire, which was quite general over the entire factory by the time of their arrival on the scene. Flames quickly spread through stairway and elevator openings, enveloping the entire factory and a large unsprinklered frame storage building. Four hundred thousand feet of lumber in the yard were also destroyed.

Apr. 11, near Anchorage, Alaska. Airplane Hangar. Loss: $350,000.

Fire occurred in the frame and plywood Morrison-Knudsen hangar at Merrill Field airport due to contact of a soldering iron with a freshly doped fabric covered plane. Two private and three public hose streams used to confine the fire to building involved. A 2000-gallon gasoline tank on a high platform only eight feet from the hangar and exploding oxygen and carbon dioxide tanks kept firemen at a distance. While several employees were injured, it is considered fortunate that loss of life did not occur, as 16 men had been quartered on the second floor of the hangar. The management had refused to bury the gasoline tank despite fire department recommendations. The loss, including building, machine tools, motors, and six airplanes, has been placed at $350,000.

Apr. 13, Elwood City, Pa. United Tube Corp. Loss: $338,585.

This plant consisted of two unprotected skeleton frame iron-clad single story structures, of a steel tube mill. The fire originated in the building where seamless tubes were being welded when an employee allowed gas to accumulate before lighting a small gas heated salamander. When he lit the salamander a small explosion occurred, igniting the oil-soaked floor, and kerosene in a pan around a tube straightening machine. Employees fought the fire ineffectually with a small extinguisher before calling the fire department. The flames spread rapidly, feeding on oil-soaked woodwork and kerosene used for cleaning rollers in the machine. Driven by a high wind, the flames ignited the exposed structure nearby. The loss was total and amounted to $338,585.

Apr. 16, Montreal, Que. Montreal Bowling Academy. Loss: $392,590.

A 4-story brick and stone, joisted building housing the city's largest bowling center was completely destroyed by a fire which also razed the adjoining Paris Café, and heavily damaged seven other business establishments, as well as seriously damaging the façade and show windows of Dupuis Frères' Department Store across St. Catherine Street. The fire, reported at 5:55 A.M. on a Sunday, started on the third floor from an unknown cause. The fire department reports that a smoke explosion caused the fire to spread all over the building and to adjoining buildings. Newspaper comment indicated that "oils and wax used in the preparation of the bowling alleys were believed responsible for the fierceness of the fire." Some 33 hose streams were used to attack the fire from all sides of the building, as well as from ladders and adjoining roofs. There were no sprinklers. The fire department figures give the loss as $175,755 on the building and $216,835 on the contents.

Apr. 19, Oklahoma City, Okla. O.K. Transfer & Storage Co. Loss: $1,000,000.

Fire, apparently due to lightning, completely destroyed the top floor of this 4-story brick and plank on timber storage warehouse and damaged portions of the contents on the second and third floors. Water damage to the remainder of the 2000 storage accounts, consisting principally of household effects, was heavy. The fire department responded to an alarm from the sprinkler system and found a fire on the second floor. The sprinklers were operating and after the fire appeared to be under control, the sprinkler system was shut off. Later fire was discovered on the third floor, where there was a quantity of wrapping paper and excelsior, having

One of many serious bowling alley fires of 1944. This one occurred in Montreal on April 16, 1944.

spread through an open space between the flooring and a column. The fire then spread rapidly through a similar space to the fourth floor and was beyond control when the sprinkler system was again turned on, though it is reported that this was done promptly. A pumper was connected to the sprinkler system to supply additional water, but by this time so many heads had opened on the lower floors that little water reached the fourth floor sprinklers. Fire fighting operations were somewhat impeded by blank walls, the windows of which had been bricked up, and the storage of furniture against the inside of barred windows. Because of the numerous claims by owners of damaged or destroyed property, the loss cannot be established at this time. It is reliably estimated, however, that the loss will approach $1,000,000.

Apr. 20, Cornwall Landing, N. Y. Cornwall Shipbuilding Co., Inc. Loss: $331,750.

This plant was engaged under war contracts in the manufacture of life rafts built of balsa wood and canvas. The plant consisted of a group of buildings in which mainly 3-story brick and fire-resistive buildings adjoined and intermingled without cutoffs with larger frame buildings, mostly 1-story in height. Fire of unknown origin, discovered near the roof of the 3-story brick blacksmith shop building, had spread, before the arrival of the fire department, into new areas of frame construction not protected by automatic sprinklers and to a lumber shed from which sprinkler protection had been withdrawn following a freeze-up during the preceding winter. Fire department hose streams used in protecting some of the low-value storage sheds and other fire fighting operations depleted the water supplies needed for protecting the main 3-story brick and fire-resistive plant buildings which were severely exposed through unprotected window openings. Fire gutted these important plant sections.

Apr. 23, Boston, Mass. Coal and Boat Yards. Loss: $315,215.

Cause of a 5-alarm fire, which destroyed some 2000 tons of coal at the Frost Coal & Oil Co. and 225 boats at the Lockery & Butts Boat Yard, has not been determined. The watchman of the coal company and a near-by bridge tender discovered flames simultaneously and gave the first alarm, which was followed by 4 subsequent alarms within 13 minutes, as flames

International.

This pier fire at Boston, Mass., on April 23, 1944, destroyed 225 boats and 2000 tons of coal.

spread from a coal pocket to two unprotected boat sheds, numerous boats and near-by dwellings. Explosion of gasoline tanks in burning power boats spread the fire.

Apr. 25, Boston, Mass. Mercantile Building. Loss: $250,000.

Heavy smoke and water damage to thousands of pairs of shoes and women's apparel, resulting from a fire in the basement of the Dexter Building, brought the loss to the quarter million dollar mark. Second and third alarms were sent in approximately three hours after the first alarm. After the second and third alarm companies responded, the fire was brought under control within a reasonable time. The fire, which was confined to the basement of this 12-story brick mercantile building, was discovered about 4:30 in the morning by two police officers who were passing by. It originated in the basement of a ladies' shoe store and spread through the hollow spaces in partitions. Smoke and heat damage occurred to tenants on the second and third floors and to the adjacent building. If the basement of the Dexter Building had been equipped with automatic sprinklers it is unlikely that any such loss would have occurred.

May 2, Lebanon, Pa. National Steel Boiler Co. Loss: $575,000.

Explosion of a fuel oil burner sprayed burning oil to the wood trusses of the roof of the heat treating department. This caused a fire which completely destroyed this unsprinklered plant. Some employees were injured by burning oil or were overcome by smoke. When the volunteer fire department arrived, the fire had gained great headway and within 20 minutes the entire roof was involved and in less than an hour the walls collapsed. Steel trusses of a new section of the plant twisted and pulled down practically all of the brick walls. The plant had about 200 employees and was making ship valves and other parts for submarines. A single fire area of over 73,000 sq. ft. and lack of private protection were major factors in this large loss.

May 3, Modesto, Calif. Modesto Hotel. Loss: $395,000.

Two guests lost their lives when a night fire started in the basement of a paint store, and swept upward through this old unsprinklered hotel building of 5-story brick-joisted construction. Although small when discovered, flames gained headway while the manager attempted to extinguish the fire before giving the alarm. When the fire department arrived, flames had already spread up open stairways and elevator shafts and initial efforts were directed to rescuing the 100 trapped guests. Fire doors aided in keeping the fire from newer sections of the hotel. Flying brands started more than a dozen roof fires and other exposure fires which were controlled by auxiliary firemen.

Hotel at Modesto, California, burning on May 3, 1944. Two guests lost their lives. The delayed alarm was a major factor in the loss.

May 5, Fort Lewis, Wash. Military Property. Loss: $592,723.

Fire destroyed Laundry Unit No. 2 operated by the Army Quartermaster Corps at Fort Lewis, Washington. According to information made available by military authorities, the building was a one-story, frame structure, with cement floor, tarpaper roof and partitions built of lumber. Fire apparently originated in the center portion of the building, which was 271 ft. long and 178½ ft. wide. The structure was not provided with automatic sprinklers. A definite cause for the fire could not be determined, but probable causes are hot blankets pulled from tumblers and placed in baskets and in piles near the tumblers, or spontaneous ignition of unprocessed clothing containing paints, oils, etc. The laundry had been inspected by the Post Fire Chief only a few days before the fire and general conditions were reported to be satisfactory. Additional data of an unofficial nature received by the N.F.P.A. Department of Fire Record indicate that the destroyed laundry was one of two identical units which were located 100 ft. apart. The destroyed unit was engaged in reconditioning of Army goods, including uniforms and other wearing apparel, blankets, bedding and mattresses. The destroyed unit had been running two shifts, with the late shift closing down at midnight, at which time a very large quantity of customers goods was in the building. It is estimated that perhaps 25% of the loss was involved in these goods. It appears that the watchman who was supposed to go on duty immediately after the laundry closed failed to report on the date of the fire and no substitute was provided. About an hour after the laundry shut down, fire was seen simultaneously by a number of persons at remote locations, but not until it had burst through the skylights of the building. The first fire company responded before an alarm was received, the man on watch having seen the fire. One factor of special interest was the apparent failure of the system of fire-reporting telephones which seemed to have been installed as a substitute for a standard fire alarm telegraph system. It is said that about the time the first fire company turned out without an alarm, the telephone on the wall of the laundry was short circuited and showed a red light on the switchboard at the post fire headquarters. Simultaneously several persons attempted to call the fire department over fire-reporting telephones on the post, with the result that the switchboard "took on the appearance of a Christmas tree."

Newspictures of Canada.

A welding torch started this pier shed fire at Montreal on May 6, 1944, and with it large quantities of valuable contents were destroyed.

Obviously, this type of alarm system does not have the succession feature common to fire alarm boxes, which operate in turn as the circuits are available. The assistant chief who responded with several pieces of apparatus attempted to turn in a second alarm on the telephone in the adjacent laundry, but was unable to contact the operator, with the result that a messenger was dispatched by automobile to fire headquarters. One of the persons who had seen the fire reported the location about a mile from the actual fire, so that one company had to be dispatched to this location before it could proceed to the actual fire. The fire chief was off duty, but a message was sent to his home and the chief was fortunate in getting the operator at headquarters switchboard by telephone and ordered an additional fire department response. However, fire fighting efforts had to be devoted to protecting the second laundry unit and the boiler plant which served both units.

May 6, Montreal, Que. Pier Storage Shed. Loss: $645,000.

Fire caused by an acetylene welding torch destroyed an 1800-foot long frame metalclad pier shed owned by the Dominion Government and leased to Canada Steamship Lines, Ltd. The unsprinklered shed housed huge quantities of rationed or scarce commodities destined for reshipment, possibly overseas. These included sugar, hemp, wire, rope, dehydrated foods, tea, alcohol in drums and a number of shell casings. Ten trucks and three tractors and trailers parked in the shed were also destroyed. Fed by the highly combustible commodities and the contents of bursting alcohol drums, the fire spread throughout the entire structure so rapidly that employees barely escaped with their lives. The fire department used no less than 23 hose streams, but could not save the property.

May 17, Wichita Falls, Texas. Cotton Warehouse. Loss: $530,000.

Fire discovered by a watchman at 5:21 A.M. involved the entire west section of a 1-story iron-clad warehouse owned by the Northwestern Compress Co. The section covered an area 300 by 250 ft. Cause of the fire is not known. The burned section of the unsprinklered warehouse contained 4887 bales of cotton of which 136 bales were salvaged. The fire department used 7 hose streams and were able to stop the fire at the first fire wall. Fire spread so fast that employees on duty had to leave before water could be turned on in private hydrants.

The unsprinklered army medical depot burning at Louisville, Ky., on May 27, 1944.

One of many food plant fires of 1944. A potato chip factory at Berwick, Pa., burning on May 19, 1944. Loss $263,000.

May 19, Berwick, Pa. Wise Delicatessen Co. Loss: $263,000.

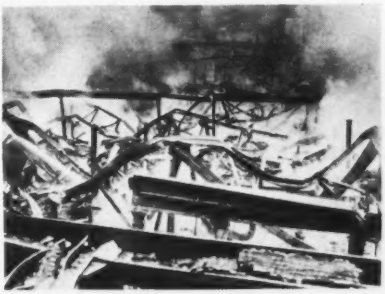
This was a potato chip factory located in a one and one-half story concrete block with a wooden roof. There were no automatic sprinklers. The fire started at 6:00 A.M. in a cooking room where 150 gallons of corn oil were being heated in a frying machine by means of fuel oil burner. The corn oil overheated and ignited. Flames spread to the packing room through conveyor belt openings in the wall and to the roof through the fumes exhaust pipe. The volunteer fire department responded, but small water mains in the neighborhood of the plant made it impossible to obtain effective hose streams to control the fire. Building and contents were totally destroyed.

May 24, Red River, Texas. Military Property. Loss: $2,000,000.

Fire of unknown origin starting at 8:30 A.M. swept through a storage building 180 ft. wide and 500 ft. long, housing rubber stock. The fire was fought by 3 near-by public fire departments, as well as fire equipment from the Red River Ordnance Depot and the Lone Star Ordnance Plant.

May 24, Princeton, N. J. University Gymnasium. Loss: $300,000.

Fire of undetermined origin destroyed the Princeton University Gymnasium building. The building had heavy stone walls and joisted floors on unprotected steel girders. Sometime between 1:30 A.M. and 2:45 A.M. fire broke out in the basement or on the first floor of the trophy room. There was no person in the building at the time, the patrolman having left the building after his 1:30 inspection tour. Smoke was observed at 2:45 A.M. by a student, who notified University police, who notified Borough police, who in turn notified the local fire department after sending a radio equipped patrol car to investigate. The fire department arrived at the scene shortly before 3:00 A.M. By this time the smoke and heat inside the building were so intense that the firemen were forced to retreat as soon as the main entrance doors were opened. Their vision obstructed by dense smoke and without any immediate attempts to ventilate the area by means of the many windows, they directed a hose stream into the smoke-filled interior more or less at random. About fifteen minutes elapsed before flames were visible, and by this time the entire gymnasium was involved. Outside help was called, but the water supply was inadequate to supply all the pumpers that responded. A stone fire wall prevented the fire from spreading into the swimming pool section, but the gymnasium, trophy room and irreplaceable contents were totally destroyed.



International.

Irreplaceable trophies were destroyed in the Princeton gym fire of May 24, 1944.

May 27, Louisville, Ky. Military Property. Loss: $400,000.

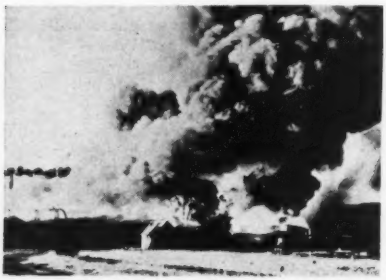
Fire of suspicious origin broke out simultaneously in two sections of the frame unsprinklered warehouse of the Army Medical Corps Depot. Employees tried to control the fire with first aid fire appliances and fire apparatus at the depot, but it spread rapidly to mattresses, bedding, pillows and medical supplies. The Louisville Fire Department responded and played a major part in controlling the fire at wall No. 2. This warehouse was divided in five sections, separated at each 240 ft. by a 1-foot brick fire wall. Combustible contents and lack of sprinkler protection were reported to be responsible in a large measure for the major loss. According to newspaper reports the depot has 2,000,000 sq. ft. of storage space. Army and Lend-lease medical supplies are reinspected, stored and repacked for overseas shipment here. Loss figure released for publication was $400,000.

International.

An $800,000 loss in a woodworker in Boston, Mass., on June 12, 1944. The fire was one of the very few big fires of incendiary origin in 1944.

June 4, near Pittsburg, Calif. Redwood Mfg. Co. Loss: $340,000.

Fire believed due to a defective motor switch, destroyed the dry kiln and main group of buildings of this lumber manufacturing establishment. Several hundred thousand feet of lumber were also lost. The buildings involved occupied about 85,000 square feet and varied from the fire-resistive dry kiln to the light frame lumber storage sheds, all unsprinklered. The fire was discovered by the fireman, who sounded the steam fire whistle, and then notified the Pittsburg Fire Department by telephone. Meanwhile four employees attempted to control the fire with a hand hose cart. The first response from Pittsburg consisted of a 350-g.p.m. pumper and two men. In attempting to turn on water in their first hydrant connection, the stem broke off, rendering the hydrant useless. Meanwhile the fire was gaining headway rapidly. Help was called, but after about fifteen minutes the plant water supply failed and the property was doomed.



A lumber manufacturing plant was destroyed in this fire near Pittsburg, Calif.

June 10, Philadelphia, Pa. Publicker Commercial Alcohol Co. Loss: $300,000.

Fire of undetermined origin destroyed a tank building and its contents at this distillery, with a $300,000 loss. The fire was discovered by employees, who called the fire department. Eight engine companies, two ladder companies and a fire boat fought the fire for nine hours and prevented its spreading to other plant units.

June 12, Boston, Mass. Tenant Manufacturing. Loss: $800,000.

This incendiary fire in a brick and plank on timber building occupied by tenant concerns with war contracts, is believed to have originated in a section occupied by a woodworking concern. A severe explosion of lacquer thinner vapors occurred, causing the collapse of a section of the building and crippling the sprinkler protection. The body of a man, who was apparently committing a theft of lacquer at the time, was found after the explosion. The fire spread to other sections of the building rapidly, as fire doors had mostly been blown off by the explosion. Windows were broken and sashes burned in an exposed structure, but the operation of some fifty sprinklers, together with outside sprinklers, kept the fire out of this building. Loss was expected to exceed $800,000.

June 13, St. Laurent, Que. Glass Works and Rubber Plant. Loss: $1,424,368.

Fire of undetermined origin swept through the factory of the Industrial Glass Works Co., Ltd., and spread to the plant of the British Rubber Co. of Canada, Ltd., resulting in a loss placed at $1,424,368. The fire started at 2:15 A.M. on the mezzanine floor of the glass works about ten minutes after the watchman had gone through the section on his round. Fire was first seen in the single story section of the unsprinklered building, which was of brick and steel frame construction, by employees who were working on the night shift in the 4-story fire-resistive melting house. They called the fire department at once. Driven by a brisk wind, the flames spread with great rapidity, generating intense heat that soon set fire to the rubber plant, 60 ft. south. The single-story section of the glass works was destroyed and heavy damage was caused to the 4-story section. The rubber factory, also an unsprinklered single-story brick steel frame building, was burned to the ground. A deficient public water supply and lack of automatic sprinklers aided in the destruction of these two plants.

June 14, Wichita Falls, Tex. Continental Oil Co. Loss: $257,500.

Three men were fatally burned and seven others injured in a series of explosions and fire which damaged this oil refinery. Explosions are said to have followed the failure of some refinery equipment which released large volumes of gases.

June 14, South Brookfield, N. S. Nova Scotia Woodworkers, Ltd. Loss: $264,000.

A major fire, starting in the mill section, almost completely destroyed this unsprinklered plant, with the exception of the office building and a warehouse. The fire supposedly started when a rubber belt rubbed against a wooden post, in a location where oil and dust had accumulated. Private hose streams at the mill had to be abandoned on account of the heat, which set fire to the other buildings at the plant. Help was called from several near-by communities, but as these were at a considerable distance, some time elapsed before firemen could begin operations and by this time the plant was doomed. Firemen prevented the flames from spreading through the brush to the village.

June 26, Jackson, Miss. Standard Millwork & Supply Co. Loss: $250,000.

An electric spark igniting vapors of a naphtha thinned paint in an open dip tank is believed to have been the cause of the major fire which destroyed this light woodworker and retail lumber yard. The single-story unsprinklered plant was of combustible construction, and of excessive area, with considerable congestion of stock. Housekeeping was not of the best and this added to the general hazard. The spread of the fire was so rapid that the fire department directed its efforts principally to protecting adjoining properties. Sprinkler equipment was being installed at the time of the fire and is reported to have been about 80% complete, but the water supply had not been connected.

June 30, Waverly, N. Y. Kasco Mills, Inc. Loss: $300,000.

An explosion, probably caused by a stone going through grinding machinery and igniting dust, blew off the roof of one of the elevators at this unsprinklered feed mill. In less than three minutes the entire mill was on fire, as well as several freight cars. Several outside volunteer departments arrived at the fire in from 7 to 18 minutes to aid the local department. Loss estimated at $300,000.

July 1, Philadelphia, Pa. Warehouses. Loss: $250,000.

Fire originated in the unprotected warehouse of Bredtt's Storage & Drayage Co. and before it was extinguished nearly nine hours later, it had destroyed the Bredtt building, the five and two-story building occupied by the M. M. Burlap Bag Co. and the McArdle & Cooney warehouse. All three buildings had brick walls and wooden interior construction. The fire was out of control by the time the fire department arrived on the scene. Thirty-four hose streams were required to prevent the spread of the flames to still more exposed properties. No accurate loss figure was available as we went to press because of the large number of claims still in litigation, but there is every indication that the loss will exceed $250,000.

July 1, Surrey, B. C. Gypsum Lime & Alabastine Co. of Canada. Loss: $500,000.

This plant of wood frame and corrugated iron construction was completely destroyed by a fire of unknown origin. Ironically, the product of this factory was gypsum wallboard, a non-combustible building material. Fire Marshal Walker of British Columbia remarks: "There was no sprinkler system in this plant. Had there been and it in operation I am satisfied this fire would have been held until such time as the fire department arrived and the loss would have been negligible." The loss, which was total, has been estimated at $500,000.

One hundred and sixty-five persons perished when the Ringling Bros. Circus "big top" went up in flames at Hartford, Conn., July 6, 1944.

July 4, near Fairfield, Ohio. Military Property. Large Loss.

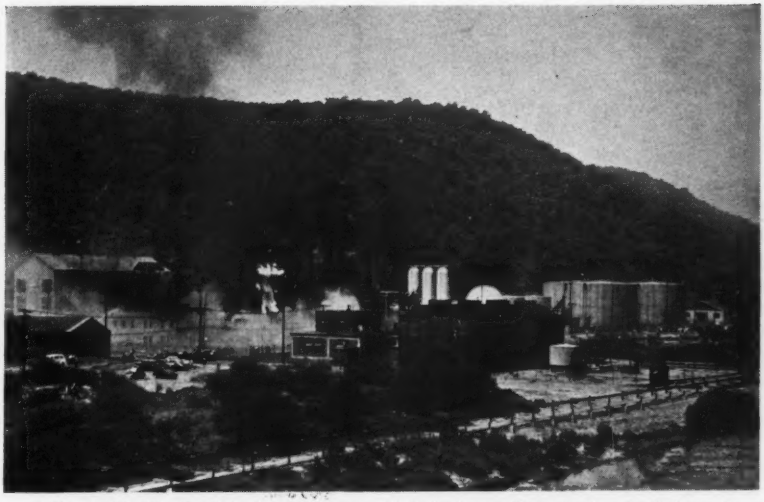
Spontaneous ignition is believed to have caused the fire which started in a trash hopper and ended with the complete destruction of a single-story unsprinklered warehouse of the Air Service Command at Patterson Field. Valuable aircraft radio equipment was lost in this fire. The trash hopper where the fire originated had not been emptied for 24 hours preceding the fire. The flames swept through the combustible contents of the cinder block warehouse, destroying the combustible roof and threatening near-by structures. Help was called from Dayton and the volunteer fire departments of Fairfield and Osborn. One fireman lost his life through a heart attack. The lack of sprinkler protection and the high value of the contents were primarily responsible for the large loss.

July 5, Cincinnati, Ohio. Produce Warehouse. Loss: $449,000.

This three-story and four-story unsprinklered brick-joisted building, formerly a railroad terminal, but more recently occupied as a wholesale grocery and produce commission house, was partially destroyed by a five-alarm fire, which is attributed to the spontaneous ignition of empty used cartons and other shipping containers which had been gathered from retail grocers and stored here. Two employees were trapped and suffocated. Upon discovering the fire, employees attempted to extinguish it with first aid fire appliances, but it was only a matter of a few minutes before the flames had swept over the large unbroken area and they had to flee to safety. It was at about this point that one of the employees, after failing to reach the fire department by telephone, ran to the fire alarm box one block distant and sent in the alarm. An automatic fire alarm system with which part of the building was equipped was temporarily out of service due to a routine checkup. The fire spread through numerous unprotected vertical openings and by the time the fire department arrived they found the three-story section completely involved, with flames breaking through the roof. Although this section of the plant was not adequately cut off from an adjacent four-story section, the firemen were successful in checking the spread of the flames. Property damage was $392,000, plus $57,000 use and occupancy loss.

July 6, Hartford, Conn. Ringling Bros. & Barnum & Bailey Circus. Loss: $100,000 plus liability.

One of the most tragic fires in recent years was the destruction of the "Big Top" of the Ringling Bros. and Barnum & Bailey Combined Shows during a matinee at the city-owned circus grounds on the outskirts of Hartford. The fire flashed across the one and a half acres of canvas and in a very few moments 165 persons, mostly women and children, lost their lives and several hundred other patrons and employees were severely burned. The weather at the time of the fire was hot and dry. The huge main tent was not flameproofed and several of the exits on one side of the tent were partially obstructed by animal cages used in the performance. Although the circus had four water tank



We could ill afford to lose this new high test gasoline plant, which burned on July 6, 1944, near Oil City, Pa.

trucks with hose connections on hand, it appears that little thought had been given to the danger of such a catastrophe on the part of either the circus men or fire officials. To most persons the circus was an outdoor show and while hazards from weather might have been anticipated, extreme danger from fire seems to have been overlooked. Even had a fire department detail been on hand, it is doubtful whether they could have prevented the flash of flame across the large area of canvas which was without fire-retardant treatment. It is questionable whether the total loss from this fire can ever be determined. Fire department officials estimate that damage to the circus equipment might approach $100,000 or more. In addition, liability claims against the circus directors resulting from the fire are known to have exceeded $1,000,000. The huge cost of caring for the injured and the deceased victims has not been definitely computed. It is also probable that although most of the victims were women and children, very sizable life insurance payments were made as a direct result of this catastrophe.

July 6, near Oil City, Pa. Oil Refinery. Loss: $725,000.

Eight men lost their lives and several others were injured in an explosion and fire that damaged this new 100-octane gasoline plant owned by the Defense Plant Corporation and operated under lease by the Pennzoil Company. Information about this fire has been largely suppressed, but reports indicate that the alkylation unit was involved and two fractionating towers were seriously damaged. Some near-by frame structures were also destroyed. The first flash is said to have occurred while repairs were being made to a valve in the gas concentration system. This was followed by a series of explosions. The fire was fought by the volunteer fire departments of Oil City and several near-by towns.

July 8, Delphi, Ind. Globe Valve Corp. Loss: $300,000.

This unprotected brick factory building with a wood roof on steel trusses was practically destroyed by a fire which is believed to have been due to spontaneous ignition of oily waste. The plant equipment, consisting principally of screw machines, drill presses, and lathes, was also ruined, together with a stock of plumbing supplies destined for the U. S. Navy. The fire was discovered in the machine shop by the night watchman, who summoned the fire department by telephone. The fire spread rapidly to the combustible roof structure and was beyond control when the firemen arrived. The steel roof trusses collapsed, dropping the burning roof onto the machines below. The entire building was gutted except for the foundry, where only the roof was destroyed. The loss, including use and occupancy, has been placed at approximately $300,000.

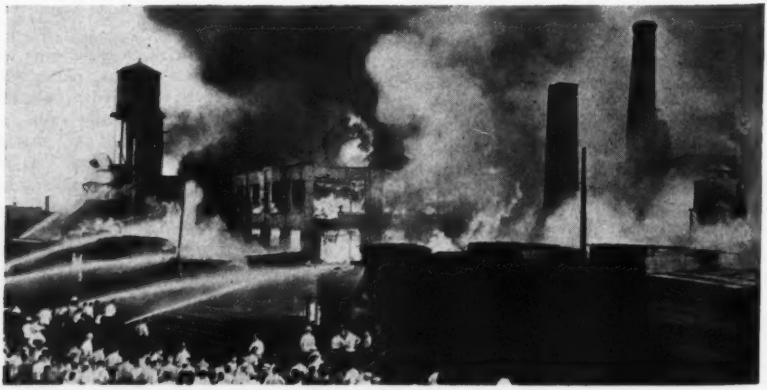
Shades of the cigarette shortage! This tobacco warehouse area burned at Durham, N. C., on July 8, 1944. Poor construction—no sprinklers.

July 8, Durham, N. C. Warehouses. Loss: $280,000.

An entire block in the tobacco warehouse area was destroyed or damaged by a fire which originated in furniture storage in the basement of one of the warehouses. The cause of the fire was not determined. No sprinklers were provided in the entire block and it was completely involved by fire within 30 minutes after arrival of the fire department. The construction was mostly frame and the areas large. Ten buildings across the street sustained exposure damage. A fire in this block had been one of the problems used in the drill school and classroom work of the Durham Fire Department.

July 9, Chicago, Ill. Boynton & Co. Loss: $600,000.

This fire started in lumber piles from an unknown cause, spread to adjoining frame lumber sheds and then through unprotected exposures to the three-story brick unsprinklered section of this woodworking plant. The fire department was handicapped by the intensity of the fire due to the combustible contents, the direction of the wind and a railroad embankment. The severity of the exposure, together with the rapidity with which woodworking occupancies burn, caused a large number of sprinkler heads to operate, resulting in the depletion of the single source gravity tank water



Acme.

A good example of unprotected exposures. Fire started in the lumber piles and quickly spread through the plant. Chicago, Ill., July 9, 1944.

supply. Unprotected window openings allowed the fire to spread to an adjoining plant, but here it was checked by the operation of automatic sprinklers and the fire department. Two other near-by factories suffered small exposure losses. The total loss from this fire, including use and occupancy approached $600,000.

July 9, St. Andrews, N. B. Vaughan Shipbuilding Co. Loss: $350,000.

This was an unprotected frame wooden shipbuilding establishment, consisting of a large irregular structure housing the woodworking shop, lumber storage and boat shed and several smaller separate frame buildings. Only the boiler house, which was directly adjacent to the main building, was of non-combustible construction. Apparently starting in the tile boiler house this fire spread through unprotected openings to the woodworking shop. This large unbroken area was entirely involved when the fire was discovered. It then spread to the boat shed, housing ships under construction, through two sheds where lumber was stored. No cut-offs had been provided, although recommendations had been made to the management with respect to providing these. It is believed that had the boiler house been of first-class construction and either detached or with standard cut-offs, the fire would have been confined to this building.

July 18, Park Ridge, Ill. Douglas Aircraft Corp. Loss: $1,500,000.

The two-story frame administration building, 605 ft. long and 134 ft. wide, met its inevitable end by fire as had been foreseen by fire protection authorities familiar with this plant. The main assembly building, also of frame construction, 3000 ft. long and 800 ft. wide, was severely exposed, but was saved by the efforts of Chicago and suburban fire companies, aided by the fairly prompt collapse of the burning administration building, which reduced the exposure danger. The plant fire brigade appears to have delayed in calling public fire department assistance for a considerable time while the fire was spreading beyond control. The first chief officer from Chicago, some four miles distant, attempted immediately to sound a fourth alarm, but found all wires at the plant burned out. He was obliged to dispatch his driver to a tavern a half-mile away to telephone the multiple alarm. Rapid spread of the flames was facilitated by a plywood lined duct which extended to all parts of the structure. Considerable engineering and production records are said to have been destroyed. The monetary loss was placed at upwards of $1,500,000.

July 19, Belen, N. M. Santa Fé Ice Co. Loss: $500,000.

The destruction of this ice manufacturing plant, serving the Santa Fe Railroad, delayed the shipment of fruits and vegetables for several days. The fire was started in the compressor room by an explosion which followed the fracture of an ammonia pipe line. An inadequate water supply, coupled with a delay in calling the city fire department, contributed to the large loss, which has been placed at $500,000.

Lacrosse Tribune.

Household goods going up in smoke. An unsprinklered warehouse burning at La-Crosse, Wis., July 25, 1944.

July 25, La Crosse, Wis. Storage Warehouse. Loss: $328,734.

Fire, possibly from spontaneous ignition, started in the center of the single-story unsprinklered brick warehouse of the Evans Cartage & Storage Co. Feeding on the paper and excelsior wrapped household goods, the fire made rapid headway and flames were bursting through the roof when the fire was discovered. The warehouse was about 312 feet in length, divided by two fire walls into three sections, each 100 or more feet in width. Although the openings in these walls were equipped with normally closed fire doors, the rapid spread of the fire from the center section to the south section gives support to the belief that one door may have been partly open. The fire wall separating the center and north sections was a deciding factor in stopping the fire at this point, although the roof was damaged by flames passing over the parapet. No watchman service or automatic sprinkler protection was provided.

What is left of the administration building of a large aircraft plant outside of Chicago. A devastating fire at this property was predicted by Chief Mullaney of Chicago and General Manager Bugbee of N.F.P.A. after an inspection in Dec., 1943. The fire occurred on July 18, 1944.

July 26, Dawson Creek, B. C. Military Property. Loss: $500,000.

Fire of unknown origin destroyed a U. S. Army Engineers post garage containing 24 assorted types of vehicles, 3 bulldozers, and valuable tools. The loss as reported in a Canadian insurance journal was $500,000. Our efforts to obtain additional information about this fire have been fruitless.

Magnesium scrap in burlap bags piled close to a steam pipe started this war plant fire in Cleveland, O., July 27, 1944.

July 27, Cleveland, Ohio. National Smelting Co. Loss: $250,000.

Fire believed due either to a careless smoker or a poorly installed water heater smokepipe destroyed one-third of the main building of this government owned magnesium smelter plant, and spread to an annex office structure, as well as near-by box cars. The main plant building was 1 equals 4 stories in height, with concrete and earth floors and roof of gypsum slabs on a steel frame. The large loss is attributed to careless housekeeping, as burlap bags filled with magnesium scraps were piled without sufficient aisle space to a height of 10 ft. in close proximity to the heater pipe. When fire was discovered, employees attempted to use a special extinguishing powder and upon failure of this effort, they resorted to a hose stream from a yard hydrant. An alarm was eventually given to the public fire department over a telephone, although there was a fire alarm box within 50 ft. of the fire. The area in which the fire started was without automatic sprinkler protection, and though the fire spread to sprinklered areas, through unprotected openings, the sprinklers had no significant effect on the fire. This fact may be attributed to the extreme hazard of the contents, the heavy draft of water by the fire department or the possibility that the sprinklers in some sections may have been shut off or clogged. It's also possible that the sprinklers may have been disrupted by explosions early in the fire. Loss for which no insurance was carried had been estimated at upward of $250,000. (See Oct., 1944, QUARTERLY, pp. 127-131.)

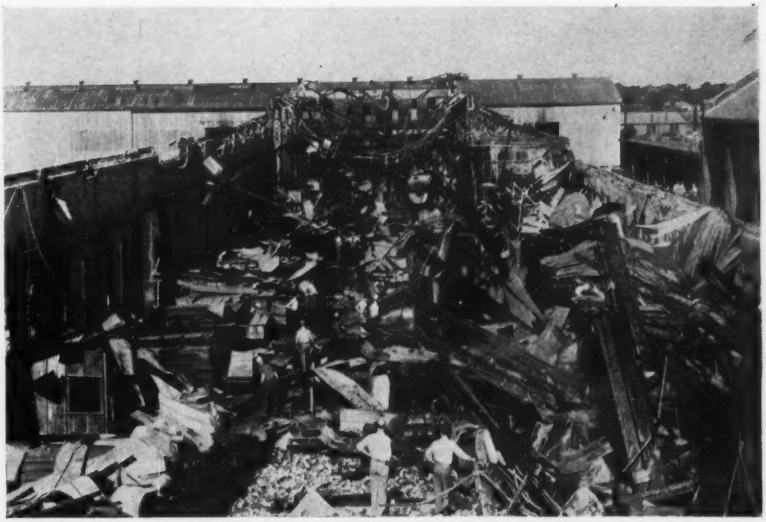
July 28, Galesburg, Ill. Butler Manufacturing Co. Loss: $400,000.

Fire started at 2:10 A.M. in a non-standard paint spray booth of this metalworking plant, manufacturing prefabricated metal buildings, including airplane hangars for the U. S. Government. The fire was presumably due to spontaneous ignition of lustreless olive drab paint, which has been blamed for numerous fires during the war period. Accumulation of paint residues and improper storage of paint drums aided in the spread of the flames. Plans for automatic sprinkler protection for this plant had been deferred because of limited municipal water supply in the plant area. However, the fire department is stated to have had adequate water supply for 6 hose streams from 6 to 8 in. mains approximately 1000 ft. from the plant. Loss $400,000 or more, exclusive of use and occupancy.

July 30, near Toledo, Ohio. American Propeller Corp. Loss: $250,000.

This plant was engaged in the manufacture of metal aircraft propellers. It consisted of a large high single-story brick and unprotected steel building without division walls, located just outside the city limits of Toledo. Certain limited areas of the building were under automatic sprinkler protection. Inside this large building were a number of plywood compartments housing X-Ray equipment, which was employed in testing the quality of the metal used in propellers. It was in one of these unsprinklered compartments that the fire originated. The flimsy construction allowed the fire to spread rapidly and fuel was added to the flames when transformer oil in the X-Ray electrical equipment became involved. However the intensity of the fire caused the steel roof trusses and decking to warp and buckle. The valuable X-Ray equipment was totally destroyed. The volunteer fire departments of Trilby and Alexis responded to a telephone call and Toledo also sent equipment. On arrival the fire department cut off the electric current because of the haz-

Scrap rubber tires stored in violation of both the U. S. Government rules and the city fire prevention requirements were responsible for this $338,000 fire on August 3, 1944, in the plant of an Akron scrap rubber reclaiming concern.



Plans for sprinkler protection of this Galesburg, Ill., war plant had been deferred. The fire didn't wait. It happened on July 28, 1944.

ard in fighting the fire in the high voltage X-Ray equipment while the current was on. Unfortunately this also shut off the electrically driven plant fire pump. Automatic sprinklers in near-by areas of the plant did much to prevent the spread of the flames.

Aug. 2, Ardmore, Okla. Cotton Compress & Peanut Oil Mill. Loss: $1,666,600.

Employees loading peanuts into the warehouse of the Choctaw Cotton Oil Company by means of an overhead conveyor discovered fire near the conveyor gallery. The building had previously been used for cottonseed storage and fire spread almost instantly throughout the building by means of accumulated lint on roof joists. One employee telephoned to the fire department and others fought the fire with 1½-in. and 2½-in. private hose streams, but their efforts were of little value due to low water pressure. Water pressure dropped seriously when employees of the Traders Compress Company, 50 ft. away, began wetting cotton with all available private hose lines to safeguard against embers and sparks. Openings in the sawtooth warehouse roofs were protected only by a wide mesh screen, which was readily penetrated by burning peanut hulls carried by the wind. On arrival of the fire department, a general alarm was sounded and two pumpers were connected to hydrants on a 6-in. main, which also supplied the private hose streams for both plants. This removed the pressure on the private lines so that they were of little value. Additional help was called from an Army air field 15 miles away and two fire trucks and police radio cars were used to patrol a rather extensive area endangered by sparks and embers carried by a strong wind. At least 8 fires due to flying brands were extinguished within 20 minutes. One large section of the cotton warehouse was saved by efforts of employees and firemen despite terrific heat which killed trees and shrubbery 300 ft. distant. It is reported that sheets of corrugated iron were carried as high as 400 ft. in the air by an updraft and fell as much as ten blocks from the fire. Dwellings 150 ft. away were severely scorched even while protected with 1½-in. hose streams.

The loss included destruction of over 23,000 bales of cotton amounting to $1,666,600. It is stated that had the cotton compress warehouse been provided with a secondary water supply, it might have been protected against the exposure fire from the peanut oil mill.

Aug. 3, Akron, Ohio. A. Schulman, Inc. Loss: $338,000.

Fire occurred in a tremendous pile of scrap rubber tires, stored without sufficient subdivisions and in violation of municipal ordinance and Rubber Reserve Corporation specifications. The cause of the fire is not known. The alarm was delayed as employees fought the fire with

A Navy warehouse loss at Portsmouth, Va., on August 4, 1944. A large concentration of values in an unsprinklered building.

inadequate first aid equipment and private hydrant lines. The fire department appeared to be making progress in controlling the fire when a shift of wind drove the flames through the entire plant, destroying four buildings.

Aug. 4, Portsmouth, Va. Navy Property. Loss: $350,000.

A storage building housing the supply department office and warehouse of the Norfolk Navy Yard was destroyed in a fire of undetermined origin. The fire first broke out at 3:48 P.M. and blazed out of control for several hours. Newspapers estimated the loss at $350,000 or more. Official reports on the fire have not been released by the Navy Department, but newspaper reports stated that all the ship's stores for a warship now under construction were lost, along with office equipment and several small trucks. The chief factor responsible for the huge loss was the concentration of valuable supplies in a single fire area, half a block long. Apparently, lack of automatic sprinklers could not be overcome by the manual fire fighting efforts of the yard fire department, augmented by municipal fire companies.

Aug. 4, Ottawa, Ont. Military Property. Loss: $320,000.

Fire of undetermined origin destroyed a semi-fire-resistive building leased from the City of Ottawa by the Dominion Government for use as a mechanical transport garage and workshop by the Canadian Army. Published reports indicate that while the unsprinklered building was classed as "fireproof," it "burned as though made of cardboard" because of highly combustible wooden partitions and other parts of the structure being impregnated with flammable liquids after four years' use as a garage. Some seventy vehicles, including jeeps, trucks and passenger cars, are reported to have been destroyed.

Aug. 5, Beaumont, Texas. Mercantiles. Loss: $400,000.

This group of mercantile and office properties, varying from 3 to 6 stories in height, was seriously damaged by fire of undetermined origin. The fire started in the 6-story brick-joisted mercantile and office structure known as the Perlstein Building and spread through large unprotected openings to the 2- and 4-story mercantile building of S. H. Kress & Co. It then burned through floor joists set in a party wall and extended into an adjacent 3-story building. An explosion, presumably of refrigeration equipment of an air conditioning system, contributed to the magnitude of the fire. Because of the short-handed condition of the fire department, considerable outside help was required to prevent further extension of the conflagration. Numerous firemen were severely affected by smoke as well as fumes from

Beaumont, Texas, fire of August 5, 1944, at its height. Photo shows Kress Building in flames just after the explosion on the fourth floor. Firemen on the aerial ladder are directing a stream into the third floor of the Perlstein Building.

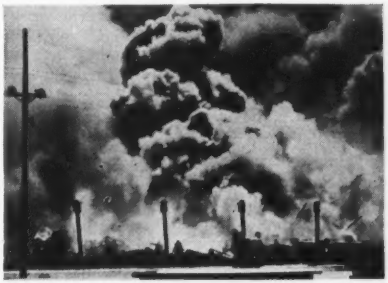
various materials in the mercantile stock. This building had long been recognized as one of the more serious fire hazards in the city due to its structural arrangement. It was without sprinkler protection. Two days after the fire, the floors in a considerable area of the Perlstein Building collapsed. The loss was in excess of $400,000. (See October, 1944, QUARTERLY, pages 107-111.)

Aug. 11, Hoboken, N. J. Steamship Pier. Loss: $1,710,000.

An explosion of a drum of nitrocellulose which was struck and damaged by a small motor-drawn carrier on Pier 4 caused a disastrous conflagration, which spread along the pier loaded with nitrocellulose and other cargo merchandise. The fire extended underneath the pier to a warehouse on the land end. Three men lost their lives. Outside help from New York City, Jersey City, Union City and Weehawken was called in. The pier was a total loss. All the efforts expended by the Coast Guard and others in supervising pier operations and fire fighting preparations were unable to prevent the loss of this pier primarily because it was of poor design and construction. (See Oct., 1944, QUARTERLY, pp 113-118.)

Aug. 17, Granite City, Ill. Military Property. Loss: Several Millions.

Fire of suspicious origin started in an enclosed section of this unsprinklered frame storage shed used for reprocessing, repairing and storing tires. The shed, which was part of the U. S. Army Engineers Depot, covered an area of approximately 5 acres and was completely filled with material for shipment overseas. This consisted of automotive equipment, cans of carbide and thousands of tanks containing various gases. The men working in the building apparently tried to fight the fire themselves. The Depot has its own fire department with seven pumpers, but it was not called until 15 minutes after the fire had started. The building was a mass of flames when they arrived. Steel cylinders of compressed gases exploded and were found as far as ¾ of a mile from the burning warehouse. Considerable damage was done to an adjoining warehouse. Fire fighters were handicapped by an inadequate water supply and an insufficiency of hydrants. While this fire was still being fought by the local brigade, aided by the St. Louis Fire Department and auxiliaries, a second serious fire broke out, necessitating additional help. The loss from these two large fires had been estimated at several million dollars.



Press Association.

More war supplies going up in smoke at an army depot at Granite City, Ill., on August 17, 1944.

Aug. 23, McCloud, Calif. Residential Property. Loss: $300,000.

Fire occurred in the attic of a 2½-story frame guest house on an estate of Wm. Randolph Hearst due to defects in old electrical wiring. Discovered in its incipient stage by a guest, the fire gained headway, as no one on the scene knew how to get into the attic and no hand fire extinguishers were available. One stream from a 2-in. hose supplied by low pressure, was used ineffectively. Attempts to use a second hose stream were futile due to the

inadequacy of the 2-in. water pipe line. After considerable delay, the McCloud Fire Department was called and made the five-mile run with two pumpers, which took suction from a swimming pool and supplied hose lines which were wyed to provide four streams from 1½-in. hose. There were no fire cutoffs in the building and with no water in the mains, it proved impossible to prevent total loss.

Sept. 1, Hamilton Twp., N. J. Roller Bearing Co. of America. Loss: $280,000.

Fire due to careless smoking occurred in the Army Air Force inspectors' office of this large warehouse and finishing building of one-story asphalt protected metal construction. This plant building was 203 x 20 ft. in area without fire cutoffs and including numerous internal hazards, such as flammable liquids used in finishing bearings, a large quantity of wax paper used for wrapping finished parts, and interior partitions of combustible wallboard on wood stud. Plant management had formerly prohibited smoking in this hazardous building, which was making vital bearings for aircraft, but was ordered to permit smoking in the office and certain other areas by the War Labor Board a short time before the fire. The guard who discovered the fire in the office shortly after closing time failed to notify firemen in a fire station across the street, but went for an extinguisher. When he returned to the office and opened the door, fire burst out with such intensity as to make the extinguisher useless and the guard notified other employees. Firemen were called by a passer-by and two companies responded promptly with 5 pieces of apparatus and at once turned in an alarm bringing 4 other township fire companies to utilize 11 hose streams in confining the fire to the large building. Firemen were forced to pump from a brook and near-by reservoir to supplement supplies from hydrants. Loss was approximately $280,000, plus substantial use and occupancy loss.

Sept. 3, Lebanon, Ind. Department Store. Loss: $380,000.

Believed to have started in the basement rest room of Adler's Department Store, this fire swept through the 2-story unsprinklered brick building and spread to two adjoining buildings housing business offices, lodge rooms and various other mercantiles. The fire was discovered by a passer by, who telephoned the fire department. The undermanned fire department was unable to enter the basement because of the dense smoke. The fire spread up open stairways to involve the large joisted area with its quantity of combustible stock. Help from the Franklin and Indianapolis fire departments rendered valuable assistance and prevented the spread of the fire to other buildings in the block.

Sept. 7, Whiteland, Ind. Vegetable Cannery. Loss: $340,000.

Fire discovered by an employee broke out at 3:30 P.M. in the south warehouse of the large frame tomato and pumpkin cannery of Stokeley Bros. & Co., causing a loss reported at $340,000. The cause was possibly an overheated elevator motor, as the blaze originated in the section of the warehouse housing the elevator shaft. Fire protection was inadequate for this type of construction. Private protection included small hose, soda-acid extinguishers and water pails. The volunteer fire department from Franklin was called and made a 5-mile run, and firemen also responded from Indianapolis, approximately 15 miles away. They were able to save the office building, commissary and loading platform, but these represented a very small proportion of the value of the plant. Some 250 employees are said to have been in the plant at the time the fire broke out and these escaped safely, but two men were severely injured when a high-pressure steam line burst. A large tomato pack held in storage was included in the loss, which amounted to $150,000 damage to building and machinery and $190,000 damage to contents.

Sept. 9, Halifax, N. S. Lumber Manufacturer. Loss: $500,000.

A fire which destroyed practically the entire lumber plant of Piercey Supplies, Ltd., including an area of ten acres, was set by two children who went into a lumber shed and deliberately ignited the stock. The blaze is said to have been so intense that firemen could not approach close enough for effective fire fighting. Water supplies were inadequate for so much combustible material and construction. The direct loss from this fire has been placed at approximately $500,000. The indirect loss not only to Piercey Supplies, Ltd., but also to the contractors and builders dependent upon them for supplies, is beyond calculation.

Sept. 10, near Tucson, Ariz. Military Property. Large Loss.

Four large technical supply warehouses at the Marana Army Air Field were destroyed by fire the origin of which was not reported. According to a news release from the Public Relations Office at the field, the fire was discovered

about 4:20 A.M. by a routine guard patrol. It originated in a warehouse measuring about 150 ft. by 50 ft. and spread before a strong wind to three other warehouses separated from one another by approximately 50 ft. intervals. The fire raged for an hour and a half and was fought by firemen from Marana and Tucson, as well as the army fire department from Davis-Montham Field. They prevented the spread of the flames to near-by machine shops and Post Engineer's buildings. In view of the size and number of warehouses destroyed and the nature of their contents it may be safely assumed that the loss was large enough to warrant including the fire in this list.

Sept. 11, Bynum, Ala. Chrysler Corp. Large Loss.

A block-long brick warehouse building at Bynum, seven miles from Anniston, was damaged by a fire which occurred during the early hours of the morning. It is understood that this property was being operated as a war plant by the Chrysler Corporation. We have been unable to obtain additional information about this fire.

Sept. 11, Baton Rouge, La. Ethyl Corp. Refinery. Large Loss.

An explosion in the Organic Chemical Division of this refinery killed two workers and caused severe property damage. The explosion was heard in all parts of the city and windows in many homes were reported broken. While newspapers estimate the loss at $100,000, it appears from the published accounts that the total damage and business interruption loss may exceed this figure substantially.

Sept. 12, St. Louis, Mo. National Foundry & Machine Co. Loss: $366,000.

Fire occurred in a brass melting room due to insufficient clearance between melting pots and wood exterior wall. Employees discovered the fire in the wall about 3 ft. below the roof and fought the fire with pump tanks and hand hose for some time before the fire was seen by a guard who telephoned the fire department. Subsequently four alarms were sounded and 18 fire department hose streams employed in stopping the spread of the fire through the main building. Water supplies were ample, but none of the fire hydrants were located east and south of the plant, necessitating a number of long hose lines. The frame addition in which the fire started was practically destroyed and considerable damage was done to the northern part of the main brick-joisted and timber constructed building. The total loss from the fire is expected to reach $366,000 because of large use and occupancy loss.

Sept. 26, Tams, W. Va. Gulf Smokeless Coal Co., No. 1 Tipple. Loss: $300,000.

Fire started on the second floor of a 400-ton bin at the preparation plant, swept through the entire plant, and spread to an approach trestle on top of the hill, a house coal bin, boiler house, covered pipe lines, feeder pole lines and also damaged adjacent railroad tracks, telephone and telegraph lines. The tipple was a large timber and steel structure, partly iron-clad, with a height of 80 ft. above the bed of a creek. It extended up a hill to a head house which was 340 ft. above the height of the creek bed at the foot of the hill. The fire was creditably fought by fire companies from Coal Town and Beckley (13 miles distant), but they were without adequate water and a high wind added to their difficulties.

Sept. 28, New York, N. Y. Balch Price & Co. Loss: $280,000.

This fur storage plant occupied two adjoining buildings, four and six stories high, of fire-resistive construction. Rupturing of a brine cooler in a refrigerating machinery room released ammonia from a 700 lb. system. Ammonia spread throughout the building and into the street. The rupturing of the cooler was followed by flash burning of ammonia, presumably ignited by electrical equipment in the machinery room. This flash or explosion disrupted equipment in the basement, sprung fire doors and fused 11 sprinkler heads, which apparently extinguished the fire. The building engineer on duty was fatally injured. There appeared to have been difficulty in locating proper valves to close the basement portion of the sprinkler system. The result was that the main valve for the entire system was closed and the main drain opened, leaving the building without protection. After most of the fire companies had returned to quarters, smoke began issuing from the building. It developed that a serious fire, requiring a second alarm assignment, was in progress on the first floor. Ninety-six sprinkler heads fused on this floor, but due to the lack of water in the system, were of no value. This fire on the first floor may have been a separate fire or may have been caused by extension of the basement fire through a vent duct, or it may have been that the electrical equipment was disrupted by the explosion, causing a subsequent fire. The large loss was due to highly combustible stock and costly interior fixtures and decorations.

Oct. 1, near Miami, Ariz. Inspiration Consolidated Copper Co. Loss: $1,000,000.

This fire was discovered by a watchman at 4:00 A.M. in a 2-equals 3-story steel frame building, partly covered with corrugated iron. This housed an electrolytic precipitation plant at the copper mine. It had combustible tanks and wood gratings between tanks. The building covered an area 460 x 102 ft., plus a generator room extending 50 ft. at one end across the entire width of the building. Fire started in one of the 20 preparation tanks, each 4 x 38 ft. in area and 3½ ft. deep. These tanks were of Douglas Fir construction protected by asphaltum base paint and lead lined. A watchman in a guard house noticed the fire and called the night operator in the tank house. These men attempted to extinguish the fire, but were unsuccessful in their efforts to use standpipe equipment due to the location of the fire and difficulty in finding the outlets. An alarm was telephoned to the plant telephone operator, who sounded the alarm and called the Miami Fire Department, which responded with a pumper. Fire fighters were handicapped by the escape of an acid solution from the tanks, which damaged the fire hose. Flames soon involved entire tank house, including the roof. Roof construction was wood on steel. Obviously the loss was due to the excessive area subject to a single fire combustible room construction on unprotected steel and inadequate watch service in the building where the fire started.

Oct. 4, No. Rochester, N. H. Spaulding Fibre Co., Inc. Loss: $641,000.

Fire started at 12:55 A.M. in a drier loaded with leatherboard for shoes on the second floor of this heavy timber mill building having wood frame exterior wall construction. The cause was believed to be an overheated bearing in the drier fan. This plant was said to be making fibre shoe soles for government use. Evidence indicates that automatic sprinklers in the drier were operating and holding the fire in check when it was discovered. The fire was discovered by a blind employee, who reported that his feet were wet by water from the sprinklers. An elderly night fireman went alone to the stair tower soon after the fire was discovered. Without carefully investigating, he closed the main sprinkler control valve, apparently assuming the fire was under control or of slight consequence. Thereafter, the fire quickly spread and involved the east end of the second floor. The night fireman meanwhile had been informed of the seriousness of the fire and sounded the mill whistle and started one of the plant fire pumps. Returning with another employee to the sprinkler valve an attempt was made to open the valve. This was subsequently found to be one-quarter open. The fire had already opened most of the sprinklers on the second floor, overtaxing the water supply. The Rochester Fire Department was called and responded in about 15 minutes time, supplying 4 hose streams from pumpers placed at the mill raceway. However, a large part of the plant was on fire when they arrived. The day fireman, who lived near by, arrived at the engine room 25 minutes after the start of the fire and found the night fireman dead near the fire pump, probably of a heart attack. Investigation indicated that a second fire pump had not been operated. All of the main building and the contents were destroyed, except the boiler house, engine room and office. The loss included $566,000 damage to building and contents and $75,000 use and occupancy loss.

Oct. 8, Roanoke, Va. Roanoke City Mills, Inc. Loss: $250,000.

Approximately twenty minutes after a watchman had made his rounds a policeman telephoned an alarm for a fire in this four-story brick mill type feed plant. The cause of the fire, which appeared to start on the first floor, is unknown. The fire was through the roof when it was discovered. Sixteen hose streams were used to flood this unsprinklered building, but total destruction resulted.

Oct. 20, Cleveland, Ohio. East Ohio Gas Co. Loss: $6,000,000.

Disaster struck and devastated part of Cleveland's industrial zone, taking the lives of not less than 130 people, and causing $6,000,000 damage. Two containers of liquefied natural gas exploded and threw sheets of flame over nearby residential areas. While a large proportion of the fatalities were gas company employees, quite a number of the victims were inhabitants of residences adjacent to the gas plant. A recent report indicates that half of the 2160 individual claims presented to the East Ohio Gas Company had been settled for $1,000,000. The company was said to be making payment of $300,000 to the City of Cleveland for repairs to streets and utility mains damaged in the blast, in addition to the destruction of the gas plant and shop buildings, believed to exceed $3,000,000 damage. (See NEWS LETTER 329, November, 1944, for a detailed report on this fire.)

Oct. 21, Los Angeles, Calif. Ships and Pier. Loss: $250,000 or more.

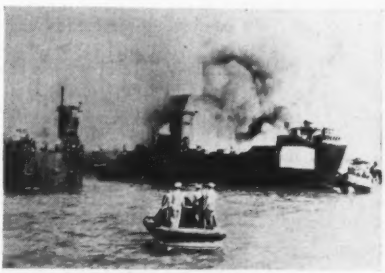
A fire occurred at Berth 223 in Los Angeles Harbor, being discovered by a Los Angeles Fire Department boat at 1:58 P.M. A spill of gasoline or other flammable liquid apparently drift-

Scene of the Cleveland gas explosion and fire of October 20, 1944.

ed into an area where men were welding on small craft, when a spark caused a flash fire. What the liquid was or where it came from has not been definitely determined. Sixteen men lost their lives from burns or drowning, of which ten were enlisted Navy personnel and six civilians. At least 50 persons were injured so as to require medical attention. The fire involved two Navy LSM's moored abreast, as well as 300 feet of a dock above and below. On the dock were a large crane, a considerable number of trucks with generators for arc welding, and other small vehicular equipment. The equipment on the dock was destroyed and the dock itself damaged. The damaged LSM's were towed into the channel. The loss is estimated by the Navy to be in excess of $225,000 and from the description of damage the loss will probably be high enough so it is appropriately included in the list of losses over $250,000.

Oct. 26, East Winnipeg, Man. Canadian Army Property. Loss: $387,000.

A night watchman was making his rounds in this 5-story brick-joisted warehouse operated by the Royal Canadian Ordnance Corps, when the freight elevator in which he was riding stalled between floors. Breaking his way out of the elevator, the watchman went to the office to report it. About 20 minutes later he smelled smoke and then saw fire coming up the elevator shaft. Subsequent investigation indicated that hot metal blown from the elevator motor at the time of failure probably caused the fire. Several alarms were transmitted by telephone and street boxes, but the fire spread upward from the basement to roof. Firemen with 15 hose streams held the fire in approximately one-quarter of the building in the vicinity of the elevator shaft, but the remainder of the structure was severely damaged. While the damage to this old quick-



International.

Burning ships in Los Angeles harbor on Oct. 21, 1944. Sixteen lives lost.

burning warehouse, erected in 1905, was estimated at only $12,000, the loss to military clothing and other supplies stored in cardboard cartons and wooden boxes is believed to approach $375,000. There were no automatic sprinklers in the building.

Oct. 26, Wichita Falls, Tex. Wichita Engineering Co. Loss: $350,000.

What happens when a plant does not have good advice on fire matters, or does not follow it, is shown by this $350,000 loss. A wood frame building with metal-clad exterior covered an area of 300 ft. long and 100 ft. wide. It had had varying occupants during the past 20 years, having been a woodworking plant, government warehouse and barracks for Army personnel. In 1943 the plant was obtained by the Defense Plant Corp. and was leased to the present tenant for the manufacture of fragmentation bomb shell casings. Production started in June, 1944. The results of successful production in this plant were receiving wide praise and the night of the fire was scheduled to see the beginning of a "swing shift" for even greater output. Unfortunately, fire hazards were poorly cared for and effective fire protection was practically non-existent. A generally congested condition existed throughout, and artificial drying of pyroxylin lacquer-dipped parts by the use of infra-red bulbs was poorly arranged and not properly ventilated. This huge frame building was not sprinklered and the only first-aid protection was from a limited number of chemical extinguishers. Fire is thought to have been caused by the breaking of an infra-red bulb installed in all-metal drying equipment having two metal pyroxylin lacquer dipping vats located at the mouth of the tunnel and with dripping pan extending inside the tunnel. The bursting bulb apparently ignited fumes in the tunnel and pyroxylin lacquer in the pans and vats, resulting in an intense fire. This dipping and drying process was located in the middle of the building as part of a continuous production chain and by chance was located under an unused frame deck approximately 7 ft. above the tunnel and extending the full length of the building. This deck furnished the needed fuel, causing flames to quickly spread the entire length of the building. The public fire department was called by telephone and when the apparatus arrived from the nearest station, located 1½ miles distant, the building was falling in and within 20 minutes was completely destroyed. The only water supply for fire fighting was an 1800 ft. dead end main, which was sufficient to supply only four small streams.

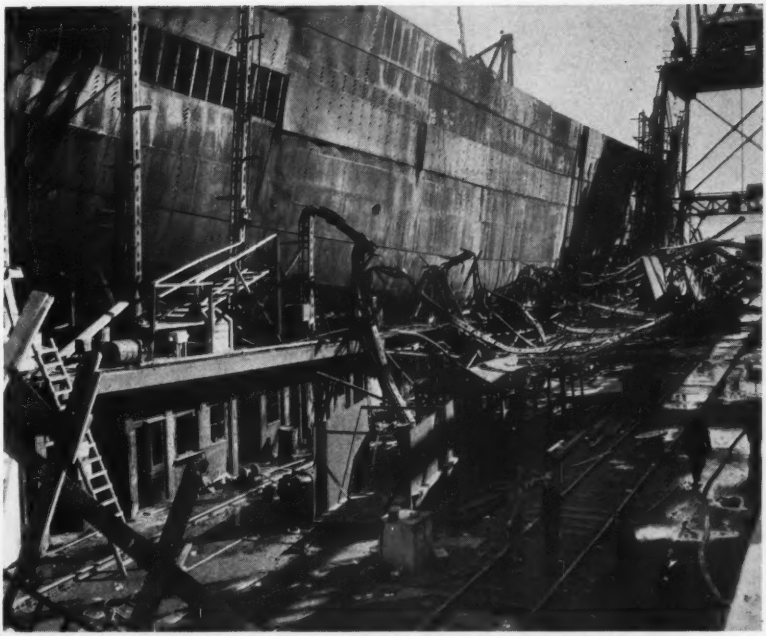
Oct. 27, Beaumont, Texas. Magnolia Refinery. Loss: $250,000 or more.

Two spheroid tanks containing high octane gasoline mixture were destroyed and three more were set on fire in an explosion. The tanks were reported only partially filled, about 9000 barrels of the fluid being in one and about 4500 barrels in the other. The three other tanks set on fire by the explosion included one with 65,000 barrels of fuel oil, and the two others were filled with high octane gasoline mixture. The products of the plant are reported largely for Army and Navy consumption. While the newspaper loss estimate is $100,000, the oil and gasoline described as destroyed would make the loss at least $250,000.

Ruins of a dehydrating plant at Brunswick, Mo., Oct. 28, 1944. This type of plant has a bad fire record.

Oct. 28, Brunswick, Mo. Alfalfa Dehydrating Plant. Loss: $308,000.

A watchman discovered a fire of unknown origin in this large frame dehydrating plant. The plant covered an area of 28,000 sq. ft. and was of wood and iron-clad construction without proper fire subdivisions. The watchman spent considerable time searching for the smoldering fire before giving the alarm. The only water supply for fire protection was from a dead end 4 in. main, 3100 ft. long, and a private fire pump which supplied two small hose streams. Due to delay in calling the local volunteer fire department, the fire spread to three sections of the warehouse and fire fighters devoted their efforts to protecting exposed mill buildings and engine house.



Press Association.

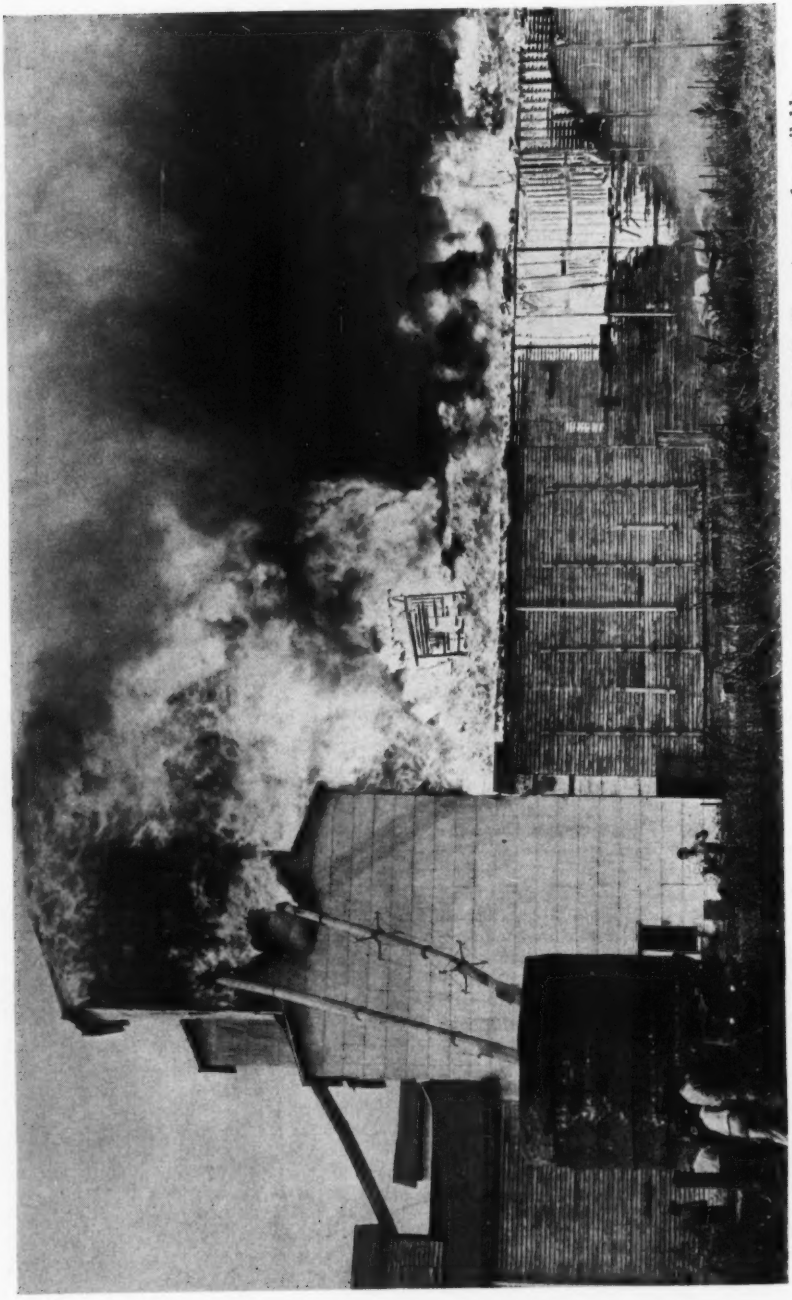
Careless smoking caused this $2,000,000 shipyard fire at Kearny, N. J., on October 29, 1944.

Oct. 28, Kenedy, Tex. Kenedy Compress Co. Loss: $400,000.

Fire of undetermined origin occurred in a cotton compress platform of wooden construction approximately 400 ft. long and was discovered by a night watchman at 10 P.M. The alarm was promptly given to the local fire department. Two neighboring fire departments were called upon for help and some 10 hose streams were placed in service from pumpers connected to private hydrants. Through strenuous efforts of firemen, employees and neighbors, the fire was prevented from spreading to the section east of the 17-inch brick fire wall which held the fire, although it was so severely damaged that it required rebuilding. Fire doors protecting fire wall openings were closed manually and gave excellent performance. The damage to buildings is placed at $100,000 and $300,000 loss to the 3000 bales of cotton which were totally destroyed.

Oct. 29, Kearny, N. J. Federal Shipbuilding & Drydock Co. Loss: $2,125,000.

A wooden shipway was destroyed and the 75 per cent completed hull of a combat-cargo vessel severely damaged, in a fire which has been attributed to careless smoking. Two other shipways and another hull also suffered damage. The fire originated in a carpenter shop located underneath the elevated end of Way No. 5 on which a 10,000-ton hull was nearing completion. The way itself was of wooden construction, with steel scaffolding. The fire started shortly after midnight and spread through the carpenter shop, an electrical supply shed, and then was driven by a stiff wind throughout the wooden shipway itself. The heat was so great that not only did the steel exterior scaffolding collapse, but wooden scaffolding within the hull was ignited and burned violently. Fire fighters from Kearny and Jersey City, aided by the Coast Guard, protected most of Way No. 6, but were unable to prevent the spread of the flames to Way No. 4, where a similar hull was somewhat damaged. As the wooden underpinning of Way No. 5 burned out, the hull dropped with a list of ten degrees. Subsequent inspection revealed damage necessitating the dismantling of this hull. Damage to the ways is placed at about $125,000, while damage to the hulls is estimated at $2,000,000.

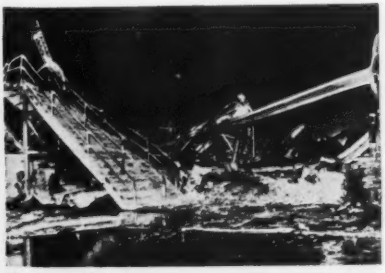


It took only thirty minutes to destroy this country grain elevator in Illinois on November 2, 1944. No water supply available.

Scene at Oregon Shipbuilding Corp., Portland, on November 6, 1944. Careless smoking plus poor construction equal total loss.

Oct. 28, No. Randall, Ohio. Race Track. Loss: $450,000.

A loss estimated at $450,000 occurred when the grandstand and clubhouse at the Thistle Down Race Track were destroyed. The structures were the usual sort of combustible construction, with inadequate protection. The first alarm went to the Warrensville Heights (a Cleveland suburb) fire department, and later on, additional assistance was received from fire departments in Maple Heights, Bedford, Shaker Heights, Orange Village, Solon, and Cleveland. Hydrants near the stands were reported to have connections to which only hose carried by the local fire department could be connected.



International.

This mass of tangled wreckage was a racetrack grandstand in Ohio. The fire occurred on October 29, 1944.

Nov. 2, near Elkhart, Ind. Country Grain Elevator. Loss: $250,000.

A large double elevator of the Federal North Iowa Grain Co. at Hurlburt Siding, containing some 80,000 bushels of soybeans, plus several thousand bushels of other grains, burned with a loss estimated at $250,000. The large plant was burned down to the ground within thirty minutes. Three fire department pumpers from Elkhart, Lincoln, and Mt. Pulaski were helpless for want of a water supply. The fire was due to an unscreened and possibly overloaded cob burner.

Nov. 6, near Portland, Ore. Oregon Shipbuilding Corp. Loss: $600,000.

This fire resulted in the destruction of a two-story wooden administration building, 325 ft. by 150 ft., with a loss of $600,000. In spite of the excessive area and combustible construction, the building was unsprinklered and without fire stops, and its complete destruction by fire was inevitable. The fire was reported due to careless smoking in a women's rest room in the basement. The first alarm given by a woman employee at 5:06 A.M. was answered by one company of the private fire brigade. At 5:20 A.M. another plant fire company was called. Not until 5:25 was help called from the near-by city of Portland. Seventeen public and four private hose streams were eventually used, but the lack of sprinklers prevented effective fire fighting. Contents of one record vault were lost due to failure to close the vault door.

Nov. 7, Blakely, Ga. Farmers Gin and Warehouse Co. Loss: $481,500.

This fire showed that even though the fire department is right on the scene when a fire is discovered, it may not do much good if the contents and construction of the building are combustible, and the building is of considerable size. When the Blakely Fire Department was called to extinguish a grass fire, the plant operators apparently did not know that a fire had been burning for some time in the building itself. Smoke was first discovered coming from under weather-boarding, but before firemen could lay a single line of hose, the whole top of the building was involved in flames. Approximately 300 tons of peanuts were in the building, which was used both as a warehouse and as a peanut shelling plant. Fire trucks from Dothan, Colquitt, and Bainbridge Army Air Base came to help fight the fire. The loss was approximately $481,500, of which $31,500 represents the value of the building.

Nov. 23, Tooele, Utah. Military Property. Loss at least $250,000.

A warehouse at the Tooele Chemical Warfare Depot was damaged in a fire. A newspaper item quotes the public relations office of the depot to the effect that half of a warehouse of 500 freight car capacity was lost, which indicates loss of at least $250,000 and probably more.

Nov. 27, Charleston, S. C. Shipyard River Terminals. Loss: $500,000.

A pier warehouse, 1000 ft. by 125 ft., of wood frame construction, together with its contents, was destroyed with a loss of approximately $500,000. About 8000 tons of nitrate of soda were stored in the building, where it was being sacked for shipment. Damage included loss to eight box cars and a number of smaller buildings. The fire was discovered by a near-by resident and he is reported to have sounded the alarm from a central station fire alarm box. Volunteer fire departments from St. Philip and St. Michael, and apparatus from Charleston and North Charleston fought the fire, restricting damage to near-by buildings, which included a machine shop of a fertilizer company and a number of smaller buildings. A stevedoring company which unloaded at the pier lost considerable equipment when the pier collapsed. Coast Guard fireboats saved one end of the pier, with the help of monitor nozzles mounted on floats, which could be pushed under the pier. The large loss, however, was due to the combustible contents and large area of combustible construction without automatic sprinkler protection.

Nov. 29, Chicago, Ill. Grain Elevator. Loss: $1,750,000.

A series of grain dust explosions in Calumet Elevator A, operated by Rosenbaum Bros., Inc., in Chicago on the morning of May 11, 1939, resulted in a loss of nine lives and the destruction of five large elevators, with a loss of approximately $3,500,000, thereby turning in the largest individual fire loss of that year. Apparently not satisfied with the doubtful distinction of having the largest fire in 1939, Rosenbaum Bros. made a bid for similar distinction in 1944. The spectacular fire, which practically destroyed their huge elevator at 87th Street and Stewart Avenue, will turn in a loss estimated at $1,750,000, which is among the top civilian fire losses for 1944. The building, which was 100 ft. square and 140 ft. high, had a capacity of 1,450,000 bushels. As is the usual case in grain elevator fires, an initial fire was followed by a dust explosion which blew out a large section of the elevator's east wall. The grain damaged was mostly soybeans. Sixty-eight pieces of fire apparatus worked at the fire.

Dec. 1, Regina, Sask. Warehouse. Loss: $300,000.

This was a 5-story brick warehouse owned by the Saskatchewan Federated Coöperatives, Ltd., and used for the storage of general merchandise, including large stocks of hardware, paints, oils, groceries, and dry goods. The building was not protected by an automatic sprinkler system and no night watchman was employed. The fire originated in the basement coal bin due to steam pipes which passed through the bin creating a temperature which ignited the coal and the frame partition. The fire spread to the fifth floor through spaces made by the shrinkage of the laminated wood floors away from the walls. When the fifth floor was weakened sufficiently by the fire, the very heavy load of flour stored there caused it to

A typical small town conflagration destroyed the center of Cowansville, Quebec, on December 3, 1944.

The Chicago Sun.

A spectacular dust explosion and fire in a Chicago grain elevator on November 29, 1944. Capacity 1,450,000 bushels. Loss $1,750,000.

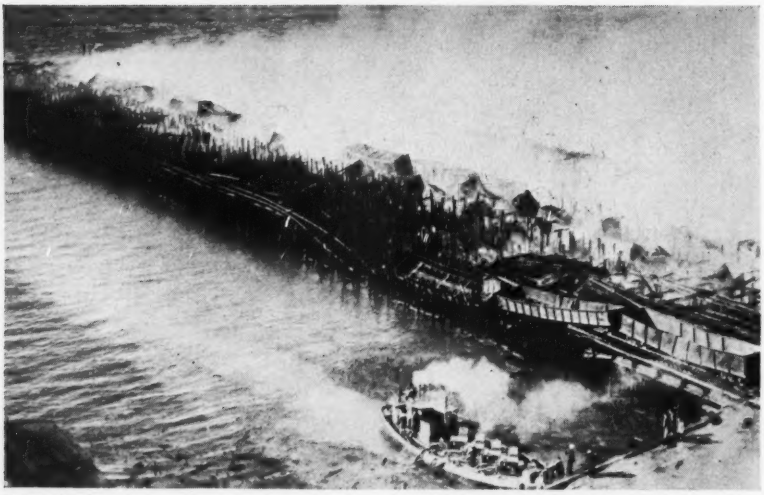
collapse to the ground floor. The fire then spread throughout the building. The fire had been in progress for a considerable time before it was discovered by a passer-by, who sounded the alarm. The building loss had been placed at about $50,000 and the loss on the contents at about $250,000.

Dec. 3, Cowansville, Que. Group Fire. Loss: $300,000.

A furniture store, two dry goods stores, and numerous other unprotected buildings housing small retail stores, apartments and offices were destroyed in the central section of this city of approximately 2000 population. The occupant of one building died from a heart attack. The fire started from an exploding stove in the basement of a small retail store. The local volunteer fire department was handicapped by subzero weather and still more by an inadequate public water system. Although eventually aided by fire pumpers from Granby, Farnham, and Montreal, they were not able to stop the fire. It is reported that two buildings were dynamited to help check the spread of the fire. The loss is expected to total approximately $300,000.

Dec. 9, Minter City, Miss. Cottonseed Oil Mill. Loss: $500,000.

A large frame warehouse containing nearly 10,000 tons of cottonseed was destroyed by a fire of unreported origin which swept through the building before the nearest fire department,



International.

Ruins of the Chesapeake and Ohio Railroad pier destroyed by fire on December 17, 1944, with a loss estimated at $1,000,000. The fire spread through the forest of creosoted wooden piling underneath the pier deck nearly four acres in area without any fire break, out of reach of hose streams. Automatic sprinklers provided to protect the pier shed superstructure had no effect on the fire under the pier deck.

21 miles distant, could respond. One end of the building was used for cleaning processes, and this portion only was equipped with automatic sprinklers. Although the cleaning room was not cut off from the seed house, the sprinklers kept the fire out of this area until the water supply in the tank was exhausted. Firemen from the Greenwood Fire Department arrived with a small trailer unit about 45 minutes after being notified of the fire by the night watchman, who discovered it. A privately owned truck with a 400 g.p.m. pump also responded from Vance, Miss.. Fire fighters were handicapped by a shortage of pumping equipment and hose and the inaccessibility of water, much of which had to be drafted from a river. They succeeded, however, in protecting some severely exposed structures. The loss is estimated at $500,000.

Dec. 17, Newport News, Va. Railroad Pier. Loss: $1,000,000.

This fire destroyed Pier 8 at the Hampton Roads Port of Embarkation. This pier, owned by the Chesapeake and Ohio Railroad, was nearly 800 feet long and 200 feet wide, of wooden construction. It was supported on creosoted wooden piles. The pier deck was made of flameproofed wood, according to reports prior to the fire; this apparently had no bearing upon the spread of the fire.

This pier was one of several piers in this port area referred to as inadequately protected in the report of the N.F.P.A. Committee on Piers and Wharves submitted to the 1937 annual meeting. In 1939 a complete system of automatic sprinklers of modern design was installed to protect the pier shed superstructure, but no adequate provision was made for extinguishing fire under the pier deck. No subdividing fire walls or fire stops had been provided for this inaccessible space as specified in the N.F.P.A. Standards for Piers and Wharves (National Fire Codes for Building Construction and Equipment). No automatic sprinklers had been provided in this space nor does it appear that there were sufficient access openings through the pier deck.

The fire started at 2:30 A.M. when the gasoline tank of a small cargo-handling truck was accidentally punctured and the gasoline ignited by sparks from the truck. The burning gasoline flowed into the space under the pier through openings at the side of a depressed railroad track section. The alarm seems to have been promptly given and the public, private and government fire fighting forces went into action promptly with over 30 fire boats in action. The fire, however, was inaccessible for any manual fire fighting and the automatic sprinkler system in the superstructure had no effect upon the fire under the pier deck.

One man was killed in this fire and 14 injured. A Liberty ship alongside the pier was set on fire, but was moved away from the pier and the fire extinguished. The railroad loss, including 40 freight cars destroyed, was $400,000,

Another "typical" business block burns at Syracuse, N. Y., on Christmas Day. Poor construction—open stairways—no sprinklers.

according to information from insurance sources. There is no information as to the loss to the ship or to U. S. Government-owned cargo on the pier, but it appears that the total loss in this fire may reach $1,000,000.

Dec. 20, Erie, Pa. Department Store. Loss: $365,000.

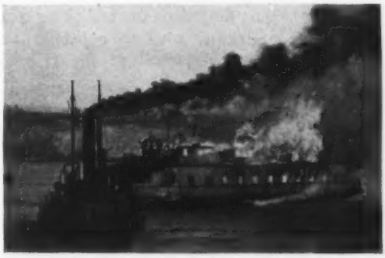
Fire of uncertain origin destroyed the four-story brick department store of W. T. Grant Co. at the peak of the Christmas buying season. A large stock of Christmas merchandise was destroyed and the building gutted. The fire is believed to have started from a defective peanut roasting machine on the first floor, and spread rapidly up unprotected elevator shafts to the upper floors. Considering the construction of the building, the huge stock of combustible merchandise and the lack of automatic sprinklers, it is not surprising that the fire department was unable to check the flames. They were successful in protecting adjacent buildings and the exposure damage was relatively small.

Dec. 21, Des Moines, Iowa. New Monarch Machine & Stamping Co. Loss: $250,000.

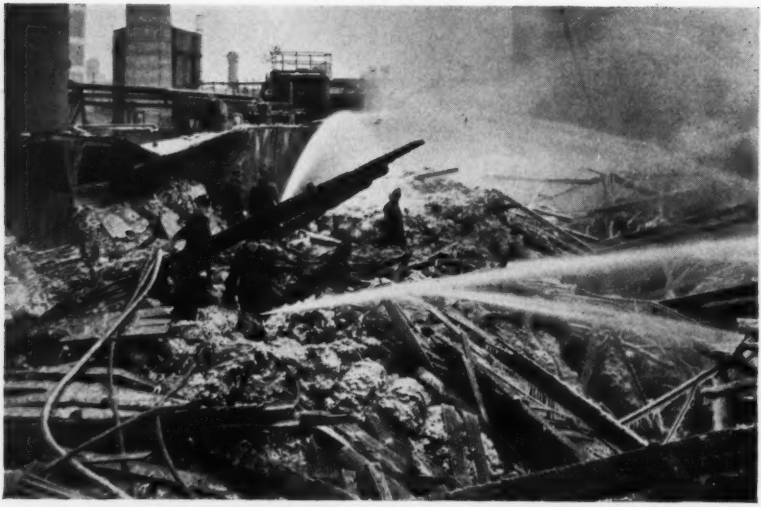
This was a two-story brick building with wood floors used primarily as a storage building for dies, consignment stocks and finished products. The fire originated in the basement near the oil heating plant apparently from a leaky condition of the oil burner. The escaped oil finally ignited and soon set fire to the wooden floor structure above. The fire department was handicapped by the near-zero weather. The warehouse was gutted and an adjacent building was severely damaged. A sprinkler contractor lost materials for a complete automatic sprinkler system, including tools and equipment for the installation, all of which was placed in the building ten days before the fire awaiting labor to install the protection.

Dec. 22, Dartmouth, N. S. Halifax-Dartmouth Ferry. Loss: $300,000.

Fire broke out in the engine room of the Diesel-electric ferry *Governor Cornwallis* as



A ferry burns at Dartmouth, N. S., on December 22, 1944, adding to the transportation shortage.



All that is left of 3,000,000 pounds of wool and a scouring plant after the fire of December 27, 1944, at Philadelphia.

she was approaching her slip at Dartmouth. While her engine room crew fought the fire below decks, the passengers were kept in ignorance of the fire and safely disembarked, together with motor vehicles, before the flames burst through the deck.

Dec. 25, Syracuse, N. Y. Mercantile Building. Loss: $500,000.

Fire of unknown origin started shortly before midnight in the basement of a three-story brick-joisted building occupied by a drug store, restaurant and a dry goods shop. The fire spread to the basement of an adjoining building of similar construction occupied as a fur and dress shop and then up through all floors. While these buildings were equipped with improved store fronts, they had no automatic sprinkler protection and stairways were open. The fire was discovered by a passer-by, who telephoned the fire department. The loss, which was practically total to buildings and contents, has been reported in the press at $500,000.

Dec. 26, Chicago, Ill. Glass Works. Loss: $540,000.

A five-alarm fire, starting in combustible packing materials, was out of control when the fire department arrived immediately after discovery by a watchman. Sprinklers had been shut off in the area where the fire started, but helped control the fire in an adjoining section. Heat radiated through wired glass windows, igniting the contents of the Wrigley factory 20 ft. away, but sprinklers worked here. Fire department saved other adjoining property.

Dec. 27, Philadelphia, Pa. Hyman Brodsky & Son Co. Loss: $250,000.

A stock of more than 3,000,000 pounds of used wool was involved in a four-alarm fire that destroyed the scouring plant of this wool processing establishment. The fire started shortly before 3:00 A.M. from an unreported source and spread so rapidly over the combustible contents that the whole interior of the building was involved by the time the fire department could respond to the alarm. The loss from this fire is difficult to estimate at this time because of the probability of considerable wool salvage, but indications are that the loss will probably exceed $250,000.

Dec. 27, Kansas City, Mo. Warehouse and Manufacturing Building. Loss: $1,110,000.

The Owens Building, a five-story brick-joisted warehouse and manufacturing building, was completely destroyed by a fire which originated in and was confined to the basement for five hours before it spread out of control throughout the property. The building was occupied by a pharmaceutical house, a wax manufacturer, a coffee concern and several clothing manufacturers. Smoke, water and some fire damage

A tenant manufacturing building burning to destruction at Kansas City, Mo., on December 27, 1944.

was suffered by three other buildings nearby. The fire started during the night in a large quantity of corrugated cartons and bales of paper bags. It was finally discovered during the early morning by a passer-by who heard the sprinkler alarm. On arrival, the first department attempted to enter the basement, but was driven back by heat and dense smoke. A pumping engine was connected to the sprinkler system and cellar pipes were used through the first floor, but apparently the water was not reaching the seat of the fire among the stacks of flat corrugated cartons. After five hours, one of the two pumpers connected to the sprinkler system broke down and almost immediately thereafter the first floor collapsed and the fire spread up throughout the building. In another hour the upper floors began to collapse and finally some of the walls fell. The fact that the sprinkler system was substandard and obsolete, having been installed in 1896, does not altogether explain this large loss. It is evident that the fire burrowed into the piles of flat cartons out of reach of the sprinklers and continued to open heads until the system was overpowered. The destruction of the Owens Building has been estimated at $1,000,000 and exposure damage about $100,000.

Dec. 31, West Salem, Ore. Cannery. Loss: $800,000.

Fire of undetermined origin destroyed the plant of the Blue Lake Fruit Canning Co. and threatened a large section of the community, as burning brands and embers from the unprotected frame buildings showered the neighborhood. According to newspaper reports the plant was razed in only one hour. The loss has been estimated at about $800,000. Additional details were lacking as we went to press.

The 1944 Fire Loss.

The following preliminary estimate of the United States fire loss for 1942, 1943, and 1944 has been released by the National Board of Fire Underwriters. These figures, based upon insurance losses, with a fixed percentage of allowance for uninsured and unreported losses, do not reflect the increased contribution to the national fire loss made by fires in uninsured government-owned properties. Such losses are not currently reported through any central agency, but it appears clear from the fragmentary information that is available, if these uninsured government losses were included the fire loss curve would show a still more pronounced upward trend.

	1942	1943	1944
January	$35,565,000	$27,733,000	$38,572,000
February	30,819,000	33,175,000	38,280,000
March	30,505,000	39,214,000	39,084,000
April	27,960,000	34,241,000	34,746,000
May	23,233,000	29,297,000	32,815,000
June	22,410,000	26,854,000	30,505,000
July	21,000,000	25,016,000	32,706,000
August	19,680,000	29,193,000	30,618,000
September	20,443,000	26,488,000	31,418,000
October	22,621,000	29,661,000	32,173,000
November	24,144,000	31,647,000	33,847,000
December	36,469,000	47,716,000	48,694,000*
Total 12 months	$314,849,000	$380,235,000	$423,458,000
Adjusted loss figures	$314,295,000	$373,000,000	

Aggregate Loss for 29 Years Is Over Eleven Billion Dollars.

1916	$258,377,952	1931	$451,643,866
1917	289,535,050	1932	400,859,554
1918	353,878,876	1933	271,453,189
1919	320,540,399	1934	271,197,296
1920	447,886,677	1935	235,263,401
1921	495,406,012	1936	266,659,449
1922	506,541,001	1937	254,959,423
1923	535,372,782	1938	258,477,944
1924	549,062,124	1939	275,102,119
1925	559,418,184	1940	285,878,697
1926	561,980,751	1941	303,895,000
1927	472,933,969	1942	314,295,000
1928	464,607,102	1943	373,000,000
1929	459,445,778	1944	423,458,000
1930	501,980,624		

*The adjusted loss figures, not available until about the middle of the year, may be expected to vary from the preliminary estimates. For several years the adjusted loss figures have been somewhat lower than the preliminary estimates. Owing to the unusual conditions in 1944, however, it is not possible to make predictions as to the final figures.

Surplus Commodity Problems.

By John B. West,
(Member N.F.P.A.).

The Government is now preparing to dispose of about one hundred billion dollars worth of plant facilities, land, machinery and commodities which will be released as soon as war conditions will permit. In fact surplus disposal has been in operation for some time, particularly for items no longer considered essential for the successful prosecution of the war. This was done under the supervision of a Surplus Commodity Administrator appointed by the President pending the passage of suitable legislation by Congress. The Armed Services have likewise disposed of considerable equipment and commodities which they no longer needed.

The impact on reconversion and normal business can be terrific regardless of the method of disposal or the legislation which has been passed by Congress.

The entire matter has had the active consideration of Congress since early last summer. The enormity of the problem can be realized when it is considered that unless this material and equipment is most carefully disposed of it can have a detrimental effect upon living standards, private enterprise, capital, commodity prices, wages, taxes, government revenue and a host of other related factors.

The government by reason of the war now has control of all production and has stored in its depots billions of dollars worth of not only munitions and armor, but also every conceivable kind of commodity used by our armed forces, and also the everyday supplies for the civilians back of the fighting fronts. In addition to this the Government, through its various agencies, has found it necessary to construct manufacturing plants valued at over fifteen billion dollars.

It is difficult to estimate the value of the supplies which will be left over after the war, but published statistics roughly estimate it between fifty and sixty billion dollars. Aircraft and ships account for about half of the current procurement program. Guns, ammunitions and other equipment not suitable for civilian use involve another quarter of the total, which leaves about one-quarter, or fifteen billion dollars, of miscellaneous items suitable for civilian use. A large portion of this may be abroad when the war ends, and may be disposed of in foreign markets, and some may be returned to this country for disposal.

Congress, after much deliberation in both House and Senate, passed the Surplus Property Act of 1944, and it has been signed by the President. The act calls for a board of three men to be appointed by the President with the approval of the Senate. This board shall have responsibility to formulate operating regulations and administer the act.

As is so frequently the case in the passing of any important legislation, there was the usual rush of the pressure groups to have their special interests incorporated in the bill.

Objectives.

The objectives as now included in the act show that the board has a very complicated problem on its hands, which will require the services of three super administrators. The objectives are listed as follows:

(a) to assure the most effective use of such property for war purposes and the common defense;

(b) to give maximum aid in the re-establishment of a peace-time economy of free independent private enterprise, the development of the maximum of independent operators in trade, industry, and agriculture, and to stimulate full employment;

(c) to facilitate the transition of enterprises from wartime to peacetime employment;

(d) to discourage monopolistic practices and to strengthen and preserve the competitive position of small business concerns in an economy of free enterprise;

(e) to foster and to render more secure family-type farming as the traditional and desirable pattern of American agriculture;

(f) to afford returning veterans an opportunity to establish themselves as proprietors of agricultural, business, and professional enterprises;

(g) to encourage and foster post-war employment opportunities;

(h) to assure the sale of surplus property in such quantities and on such terms as will discourage disposal to speculators or for speculative purposes;

(i) to establish and develop foreign markets and promote mutually advantageous economic relations between the United States and other countries by the orderly disposition of surplus property in other countries;

(j) to avoid dislocations of the domestic economy and of international economic relations;

(k) to foster the wide distribution of surplus commodities to consumers at fair prices;

(l) to effect broad and equitable distribution of surplus property;

(m) to achieve the prompt and full utilization of surplus property at fair prices to the consumer through disposal at home and abroad with due regard for the protection of free markets and competitive prices from dislocation resulting from uncontrolled dumping;

(n) to utilize normal channels of trade and commerce to the extent consistent with efficient and economic distribution and the promotion of the general objectives of this Act (without discriminating against the establishment of new enterprises);

(o) to promote production, employment of labor, and utilization of the productive capacity and the natural and agricultural resources of the country;

(p) to foster the development of new independent enterprise;

(q) to prevent insofar as possible unusual and excessive profits being made out of surplus property;

(r) to dispose of surplus property as promptly as feasible without fostering monopoly or restraint of trade, or unduly disturbing the economy, or encouraging hoarding of such property, and to facilitate prompt redistribution of such property to consumers;

(s) to dispose of surplus Government-owned transportation facilities and equipment in such manner as to promote an adequate and economical national transportation system; and

(t) except as otherwise provided, to obtain for the Government, as nearly as possible, the fair value of surplus property upon its disposition.

It will be noted from the objectives that big business must be considered without a trace of any monopolistic tendencies; at the same time small business interest must be protected; we must have the fullest post-war employment opportunities; maintain the vital interests af labor; there shall be no dumping of commodities on the market, and sale to speculators shall be avoided; new independent enterprises shall be developed where possible; agricultural economy shall not be disturbed; foreign markets shall be promoted; institutional and charitable non-profit organizations shall get their share when a suitable market does not present itself for surplus facilities; there shall be special dispositions for U. S. Veterans, and after all these things are given proper consideration we come to the final objective which is to obtain for the Government, and that includes all taxpayers, as nearly as possible the fair value for all surplus material.

Magnitude of the Problem.

Do not think for a minute that Congress does not realize the magnitude of this job nor the seriousness involved. Do not think that the business interests in the country have any desire that they should sit idly by until this material is disposed of, neither are they in favor of dumping the goods on the market at cutthroat prices. The act as originally prepared was designed to serve as a stabilizer during the difficult Reconversion or Transition period.

Recently a high ranking officer in the Armed Services, when confronted with a staggering concentration of values in a certain warehouse which was subject to one devastating fire and lacked proper protection, stated that the material stored was no longer necessary to the successful prosecution of the war, he could see no good reason for spending Government money for additional protection, and in his frank opinion it would be a blessing if it burned up.

Selfish business interest may have the same feeling about surplus material, but all those who realize the detrimental effects of fire losses have a duty as citizens and taxpayers to see that this does not happen, and that the Government secures the maximum reclaim and resale value for all surplus materials.

Reconversion to be successful must function smoothly and as swiftly as possi-

ble, and yet there will be many industrial plants, and particularly those large Defense Plant Corporation properties, which must continue to operate right up to the cessation of the war. At which time there will be an immediate demand for the termination of war contracts, and vast inventories will have to be handled speedily and removed from manufacturing plants. Storage space must be found promptly not only for materials, but for war machinery.

Storage Huts.

In order to ease this impact the new act makes certain provisions about advance planning, and defines these responsibilities. In addition to this, the Defense Plant Corporation and the Reconstruction Finance Corporation have awarded contracts for the fabrication of some 600 storage huts which will be of all metal construction, in sections 20′ x 100′ which will be shipped to those plants where the removal of heavy machinery and machine tools must be expedited in order to clear the way for reconversion. The use of these huts or sheds is unique in that usual warehousing procedure is reversed—that is, the heavy equipment is removed to a concrete mat in the yard near the manufacturing facility and after the equipment is located there the metal hut or shed is erected over the equipment. The sides and ends of these buildings have removable panels to facilitate shipment of goods. If additional space is needed they can be supplied in units of 100′ which are attachable.

There will be, undoubtedly, a tendency to locate these huts or sheds near or adjacent to main buildings, and while they will be suitable for the storage of machine tools and other non-combustible equipment they should not be used for concentrations of combustibles.

Defense Plant Buildings.

Many of the larger Defense Plant Corporation Buildings will probably be declared surplus and some people have already suggested that these structures with their huge areas and high roofs would make fine shelters for surplus materials of all descriptions. However, many of these non-combustible structures now house non-combustible occupancies and are not equipped with automatic sprinklers, at present require but meager hydrant and other fire protection. Their use for the concentration of millions of dollars worth of combustibles and crated materials could result in a fire which might aggravate the present scarcity of certain commodities to say nothing of the monetary loss to the taxpayers.

Other Defense Plant Corporation buildings are fully protected and with proper attention to common storage and warehousing rules would be ideal additions to our short storage space.

The R. F. C. through its subsidiary the Defense Plant Corporation has in general had its property fully covered by fire insurance, and these properties have therefore been subject to inspection by our leading fire protection organizations. This service is normally discontinued when the property is taken over and operated by any division of the Armed Services. Very few Defense Plant Corporation plants have been declared surplus to date, but there are reports that if and when they are declared surplus all insurance is to be canceled. Such a procedure may leave many large properties without the care and maintenance of the former responsible operators. Such buildings may be placed in the hands of a caretaker or someone entirely unfamiliar with the need of maintaining existing fire protection. In some cases all machinery and equipment will be removed, leaving a building of combustible construction which has automatic sprinkler protection. Later with the advent of cold weather all protection may be shut off to conserve fuel. It must also be considered that when manufacturing ceases electrical service is frequently discontinued, which in turn impairs electric fire pump service. Failure to maintain adequate heat also necessitates the draining of fire pump lines and gravity tanks, thus impairing the water supplies.

Obviously definite provision for such eventualities should be incorporated in the regulations to be formulated by the Surplus Disposal Board, and if this is not done it will be the duty of local fire protection organizations, particularly municipal and public departments, to keep watch and use their influence to see that all existing protection is maintained, and that reason-

able precautions are taken to prevent loss by fire in properties of this type.

Those normally charged with the responsibility for warehousing and disposal may not appreciate the hazards of fire and the danger of concentrations. The job is so large that there is bound to be decentralization and necessary redelegation of authority.

But what does the Act state regarding the provision of proper fire protection? It is all defined under the term "Care and Handling." The term "Care and Handling" includes completing, repairing, converting, rehabilitating, operating, maintaining, preserving, protecting, insuring, storing, packing, handling, and transporting, and in the case of property which is dangerous to public health and safety, destroying or rendering innocuous such property. That is all that the Act stipulates and this is not very definite.

Fire Protection Problems.

In the absence of more definite provisions there are several fire protection problems which should have careful consideration. The fact that "Care and Handling" includes all the features outlined above, that is—completing, repairing, converting, rehabilitating, and packing, etc., would indicate that the proposed storage may be exposed to these common manufacturing hazards. Furthermore it is reasonable to assume that repairing, painting, cleaning, and packing may be done in the same area with storage. The results should be obvious, particularly if storage is combustible or if buildings are of combustible construction and the contents mostly non-combustible. If the buildings are sprinklered and volatile cleaning or painting materials are introduced, serious water damage is possible.

These are all problems for the experienced fire protection engineer and should not be left to laymen. The objectives of this act can be protected and proposed disposal carried out in an orderly and safe manner if the following precautions are included in operating regulations.

1. The organization which the Disposal Board will formulate should include the services of experienced fire protection engineers, not only to draw the necessary regulations for safe storage, but also to see that the regulations are properly enforced.

Careful selection of storage sites should include the use of non-combustible buildings for non-combustible storage where possible, when automatic sprinkler protection is not available.

2. Combustible storage should be confined to sprinklered buildings, particularly if the values are high and the materials are critical to civilian requirements.

3. All existing fire protection both in buildings to be disposed of and buildings used for storage should be maintained in normal operating condition.

4. N.F.P.A. Standards, underwriters' suggestions and the War Production Board Storage Specifications* for critical materials should be strictly adhered to with due consideration to

(a) size and construction of areas.

(b) excessive high piling, maintenance of proper aisles and subdivision, order and neatness (housekeeping). Smoking regulations, etc.

(c) All painting, converting, rehabilitating and repairing should be done outside of main storage areas and the established rules for the handling and use of flammable liquids strictly enforced.

(d) Standard guard and watchman service should be maintained and all security representatives should be properly instructed in fire protection.

5. Temporary heating facilities, such as coal stoves, salamanders, should be generally avoided.

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*National Fire Codes, Vol. III, Building Construction and Equipment, published by the N.F.P.A.

Sprinklers Provide Safety to Life from Fire.

By Henry A. Fiske,
Grinnell Company, Inc.

N.F.P.A. fire records extending over a period of some 50 years show that loss of life by fire in buildings provided with automatic sprinkler protection is so slight that for all practical purposes, automatic sprinklers may be said to provide complete safety to life from fire. Some general information on the subject was published in the QUARTERLY for October, 1930, under the heading "Loss of Life in Sprinklered Fires." The intent of the present article is to give further details, with special reference to safety to life in the general class of Mercantile Properties and the so-called Light Hazard Properties, such as Hotels, Institutions, Schools, etc.

General conditions have changed but little since 1930, and the following conclusions are as true today as when written. "That it is today an almost unquestioned fact that the automatic sprinkler affords the largest degree of protection of life against fire in practically all cases where there is combustible construction or material, the rapid burning of which is liable to be a menace to the lives of the occupants of the building."

The statistics shown in the 1930 article were based on reports of 52,303 fires in properties equipped with sprinklers covering a period of some 32 years, and showed 119 fires where there was loss of life, totaling 386 persons. Similar tabulations at this time would include reports on over 85,000 fires with a similar percentage of lives lost, but with some increase during the last two or three years due to war conditions. We again reach the conclusion that in most cases loss of life is due to severe fire hazard, explosions, flash fires, etc., sometimes combined with sub-standard or poorly maintained sprinkler equipments.

Before discussing the value of automatic sprinklers in preventing loss of life in various classes of property, certain fundamentals should be made clear.

1. If conditions are such that explosions or flash fires may occur where automatic sprinkler systems cannot be expected to promptly and effectively control the fire, then loss of life may occur.
2. If the sprinkler system is not properly maintained, loss of life may occur.
3. Firemen may lose their lives under conditions where occupants of the building are not involved, as in exposure fires, falling walls, smoke or fumes.
4. Loss of life from fire, usually restricted to one person, may occur under conditions where sprinkler protection is in no way related to the accident, fatal results occurring before sprinklers can operate or be effective.

If we now divide our study of the fire record into three general classes of property, such as manufacturing, mercantile, and so-called "light hazard" (schools, hotels, etc.) we find that the above mentioned unusual conditions apply chiefly to the manufacturing classes (using this term very broadly) and do not apply in mercantile and light hazard occupancies except to a negligible extent.

There have been over the years a number of serious fires in manufacturing properties with considerable loss of life, practically all of which come under the headings above mentioned. A few examples will suffice.

The rupture of a pressure vessel containing naphtha in a linseed oil plant in

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Mr. Fiske has been a member of the N.F.P.A. Committee on Automatic Sprinklers since 1902 and has been a long-time student of the value of automatic sprinkler protection in the reduction of life hazards from fire. He took a leading part in the N.F.P.A. Committee on Automatic Sprinklers in the development of the Standards for Sprinkler Systems for Light Hazard Occupancy (originally designated as Class B systems), designed to provide adequate protection for schools, hotels and other light hazard occupancies at a lesser expense than would be involved in the installation of the standard system for industrial and mercantile occupanices.—ED.

International.

Thirty-eight patients were trapped and burned to death in this fire in the Forest Park Sanitarium near Seattle, Washington, January 31, 1943. Fire occurred in the early afternoon, but many of the aged and feeble patients were burned in their beds. Combustible buildings such as these are unsafe for institutional occupancy without the protection of automatic sprinklers.

Chicago caused rapid spread of fire and several lives were lost. In several cases dust explosions in sprinklered grain elevators and cereal mills wrecked the building, and lives were lost. Other examples could be given, but perhaps the fire and explosion in an automobile body plant in Detroit some seventeen years ago caused as much comment as any fire resulting in large loss of life. The sprinkler equipment was in service and considered adequate, but there was the unusual condition of accumulated pyroxylin dust which exploded, causing rapid spread of fire. The loss of life exceeded twenty employees, and loss of property was around two million. This resulted in materially improved conditions in such properties.

It may be estimated that the value of property in this country protected by automatic sprinklers is in excess of seventy billion dollars, and that during business hours there is an average of twenty million people or more in these properties. The fire record of the N.F.P.A. for properties equipped with sprinklers is fairly complete, and based on this, we can estimate twenty lives lost by fire each year under normal peace time conditions. Then let us estimate the yearly man hours at twenty million, times eight hours, times two hundred fifty days, which results in forty billion man hours. This gives us less than one loss of life by fire in properties equipped with sprinklers for every billion man hours.

It is impossible to definitely compare this fantastic figure with the same conditions, without sprinklers, but based on the estimate of ten thousand lives lost by fire each year, and such figures as are available, it is a good guess that at least one thousand lives are lost each year in industrial or other properties similar to those equipped with sprinklers. This is perhaps fifty times as many as for such properties

with sprinkler protection, and it can also be estimated that the value of these unsprinklered properties is not more than the value of sprinklered properties, and the number of people that congregate may be materially less than in sprinklered properties.

Furthermore, the large and hazardous industrial properties, where most of the loss of life occurs, are largely equipped with sprinklers. We cannot conceive of the development of industry to its present efficiency and safety without automatic sprinkler protection.

This leads to the conclusion that a person is fifty to one hundred times as safe in a property equipped with sprinklers, and this can be accepted as a reasonable estimate, applying to *all* sprinklered properties, and *all* conditions in such properties.

But we will go further than that, and consider the value of sprinklers as safeguarding life in other than manufacturing properties, i.e., properties which are relatively free from severe explosion and flash fire hazards which cause most of the loss of life. We refer specifically to two general classes.

1. Mercantile, which includes stores of all kinds, warehouses, etc.

2. So-called Light Hazard Properties, such as Hospitals, Institutions, Hotels, Clubs, Apartment Houses, Public Buildings, Schools, etc.

The following analysis leads to the conclusion that when sprinklers are installed, loss of life by fire in both of these classes of property has been eliminated. That this statement is correct is definitely shown by the N.F.P.A. fire reports in these classes of property. We properly eliminate those exceptional cases where fatal results occur before sprinklers can operate or become effective, as for instance, the use of naphtha, smoking in bed, etc. So let us look further at these two general classes.

The mercantile class is of great importance. Not only are the property values very large in this class of sprinklered occupancies, but the number of people that congregate in such properties runs into the millions. Can you conceive of greater danger to life than the big department stores if they were not equipped with sprinklers?

Congestion of people in the basement of such stores, with lack of sufficient exits, numerous fire hazards, and possibility of panic, presents conditions which could not be tolerated without sprinkler protection. Two large department stores burned in France, with large loss of life.

In this country most large mercantiles are equipped with sprinklers, and loss of life over the years has been negligible. In other words, the fire records of this large and important class of property show that complete safety to life has been obtained by the installation of automatic sprinklers.

Of even greater interest, perhaps, is the second class of sprinklered properties generally known and designated as Light Hazard properties, and we can divide this into several sub-classifications, such as Hotels and Apartment Houses, Hospitals and Institutions, Schools and Colleges, Restaurants and Night Clubs, Office Buildings, Public Buildings, etc. Before taking these up specifically, some general remarks are in order.

Because of the relatively small amount of combustible contents, as compared to most manufacturing and mercantile occupancies, the construction of the building is of much more relative importance from the standpoint of safety to life.

A properly constructed fire-resistive Hotel or Office Building may be very safe from the standpoint of Safety to Life without sprinklers, or as is often done, sprinklers may be installed in basements or the more hazardous or working portions. On the other hand, a Hotel of combustible construction may be a veritable fire trap, as has often proven to be the case. This is similarly true of other so-called Light Hazard properties.

We will not attempt to analyze these classes when of Fire-resistive construction from the standpoint of Safety to Life, but in passing we can mention the large loss of life in a Cleveland Hospital of good fire-resistive construction, due to the storage of film in a vault in basement, the fumes from the film fire spreading through the building. This simply shows that even in fire-resistive buildings, serious fire hazards may exist, and automatic sprinkler protection may be necessary for certain hazards or locations.

Let us now consider Hotels and Apartment Houses of ordinary construction.

Acme.

Thirty-five persons lost their lives in the burning of the Terminal Hotel, Atlanta, on May 16, 1938. This five-story hotel building of quick burning construction was typical of thousands of buildings throughout the country which are not safe for hotel occupancy without automatic sprinklers. The rapid spread of the fire cut off stairs and elevators; flames were pouring from the windows and guests were jumping to the ground when firemen arrived.

Hotels are roughly divided into two classes, namely, City or Town Hotels for all the year round service, and Season Hotels. Large loss of life by fire has occurred in both types of hotels and perhaps more lives have been lost than in any other occupancy class.

A recent N.F.P.A. report on Hotels lists some 545 fires where there was loss of life in properties without sprinklers, and a total of 1107 lives lost. The same report states that there were 565 fires in Hotels and Apartment Houses, wholly or partly equipped with sprinklers. Practically all of these fires were properly controlled by the sprinklers, and there was no loss of life in any of these fires. That is, about the same number of fires in each case, with 1107 persons killed where no sprinklers, and no lives lost where there were sprinklers.

An up-to-date N.F.P.A. study of Hospitals and Institutions shows 58 fires and 229 lives lost in the past ten years without sprinklers, with no loss of life where such properties were equipped with sprinklers.

The fire record of Schools shows similar results, namely, 60 fires with 827 lives lost, where no sprinkler protection, and 76 fires and no loss of life where there was such protection.

The fire records clearly demonstrate that in both mercantile and "light hazard" properties, regardless of construction, automatic sprinklers provide adequate and satisfactory protection against loss of life by fire.

Now it happens that because of insurance premium savings, most large mercantile properties are equipped with sprinklers regardless of the value of such protection from the standpoint of Safety to Life. This is primarily due to the large value of building and contents per square foot of floor area, and the relatively high insurance rates for unsprinklered mercantiles due to the combustible contents. Because of this, and the large reduction in insurance rates for sprinkler protection, the savings in insurance cost may pay for the cost of sprinkler protection in a few years. In other words, a sprinkler system

Burning of the Knoxville School in Pittsburgh, December 21, 1944. Most of the 900 children had been dismissed before the fire and no lives were lost. School buildings such as this are unsafe without automatic sprinklers.

Ruins of the Strand Theatre in Brockton, Mass., after the fire on March 10, 1941, in which 13 firemen lost their lives. The fire started in the combustible basement, which lacked automatic sprinkler protection, and spread up open ducts to the roof spaces. Loss of life occurred when the roof collapsed.

is an excellent investment, and at the same time greatly reduces the danger of property loss or interruption of a going or profitable business.

With so-called Light Hazard properties, however, it may not work out that way. Values of buildings and contents per square foot of floor area are much less, the insurance rate may be less, and the saving in insurance cost because of sprinklers is, therefore, materially less than for mercantiles. Also the importance of serious loss by fire from a business standpoint may be less, and the result is that relatively few light hazard properties are equipped with sprinklers.

On the other hand, safety to life from fire may be of great importance, as in Hotels, Institutions, Hospitals, Schools, Public Buildings, Places of Assembly, etc. Progressive owners of property and citizens generally are beginning to recognize their responsibility in providing sprinkler protection in such properties, but in many cases the cost seems to be an important obstacle, and the question arises—how can this be overcome? Compulsion by law may be construed an unreasonable hardship when applied to old properties, and this does not seem to work well in practice, either because of difficulties in framing the law itself, or lack of proper enforcement methods.

A better understanding of the problem will help, and effective work can be done by local fire protection committees or by local or State officials through inspection, investigation, and proper publicity.

The members of any community have certain inherent rights in requiring proper safeguards for themselves and others, and by organization and concerted action, whatever is reasonable should be possible of accomplishment.

Over the years there have been a few fires, and only a few, which have resulted in improved conditions in general or even locally. The Iroquois Theatre disaster in Chicago is the most noteworthy. This fire occurred some forty years ago, started on the stage, and 572 persons lost their lives. The adoption of many State and City regulations followed, property owners accepted the verdict, and this resulted in

better construction, various safeguards, and the general installation of sprinkler systems in the stage section, basement, dressing rooms, storerooms, attics, etc. Largely because of these improvements, there has been no appreciable loss of life in theatres in recent years. Numerous fires have occurred which have been extinguished or controlled by sprinklers, some of which might have resulted in loss of life or large property damage except for automatic sprinkler protection.

Another notorious holocaust was the Triangle Shirt Waist fire in New York City, where 145 employees were killed. This fire occurred on the twelfth floor of a loft building of non-combustible construction, and without sprinkler protection. It resulted in laws requiring sprinklers in loft buildings over a certain height.

Because of a serious fire in an apartment house resulting in considerable loss of life, the City of Boston, several years ago, adopted an ordinance requiring automatic sprinklers in all ordinary construction apartment houses over a certain size and height. Sprinklers were installed in many such properties, the regulations providing for sprinklers throughout the basement, hallways, stairways, and kitchens. The fire record shows that there has never been any loss of life or even serious damage to property in any apartment house so equipped. Furthermore, maintenance of the sprinkler system has been satisfactory, in part due to insurance inspections, and it appears that the sprinkler system has been in good operative condition in all of two hundred or more fires where sprinklers operated.

Mention should be made of one of the most serious fires of all time, the Cocoanut Grove Night Club fire in Boston, where nearly 500 lives were lost. Automatic sprinkler protection would have undoubtedly prevented this disaster.

The value of automatic sprinklers from the standpoint of safety to life has been definitely recognized in the National Exit Code and in many building codes by permitting larger areas for certain occupancies and reduction in Exit requirements where sprinklers are installed.

The N.F.P.A. adopted in 1937 an ordinance covering requirements for automatic sprinkler equipments in various types of buildings and occupancies. This serves as a guide to those interested in an ordinance of this nature or in the revision of building codes.

To conclude, this statement can be made. There is one kind or type of fire protection, and only one, which over the years has proven itself, and which gives a definite and complete answer to this problem of Safety to Life from Fire, namely, Automatic Sprinkler Protection.

School Buildings Need Protection.

By S. F. Tirrell, Engineer
Associated Factory Mutual Fire Insurance Companies.

The lives of 540 children in Providence, Rhode Island, were periled when fire from an undetermined cause destroyed a 66-year-old fire-hazardous school building on January 4, 1940. Only the prompt response and heroic work of the public fire department plus the cool-headedness of the teachers prevented what could easily have been the nation's worst catastrophe of its kind. There was no loss of life and only ten people received minor injuries, although school was in session when the fire occurred.

This Providence school, the Point Street Elementary, was typical of many others in the city, and architecturally similar in design to those of comparable age in other cities and many of even more recent date. The school had three stories above street level for classrooms, an assembly hall of moderate size on the third floor and the usual supply closets. There was also a basement for washrooms, a heating plant and a large unused and unfinished attic space. Exterior walls were brick. Most interior walls were made up of wood studs, wood lath and plaster and matched wood sheathing. The inside wall finish on the brick walls was of similar construction. There were three stairways, all of wood construction and open to corridors and the basement in all stories. There were also three outside fire escapes. For fire protective equipment there was a manually operated fire alarm signal system, and fire extinguishers. The alarm system and extinguishers were used effectively.

This was the remains of the Point Street School's stairway, open to the corridors and of wooden construction, when fire swept through the school.

Fire-resistive school exits are closed off from corridors by swinging doors and clearly marked.

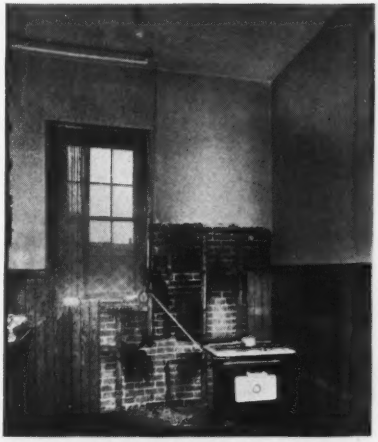
How seriously exposed the lives of school children are in this type of building is sharply emphasized by this fire. The quick burning construction with lack of suitable fire and smoke stops, open stairways, large open attic spaces, hollow wood joist wall, roof and floors are features highly conducive to the rapid spread of fire and smoke.

Awakened to the fire-hazardous conditions prevailing in Providence schools, the Public School Department promoted a survey of public schools in the city to determine if and where the life-safety of occupants might be endangered and to discover whatever practical safeguards and improvements were needed. Deficiencies

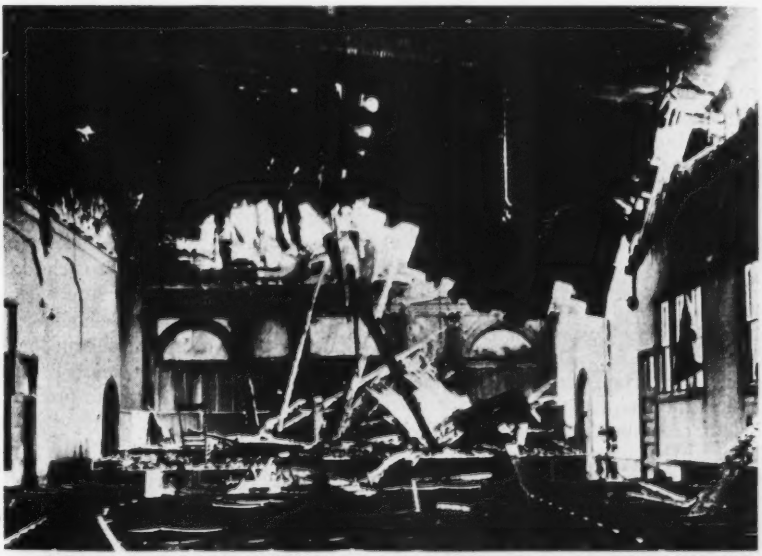
found were due largely to types of construction which were characteristic of the period in which each school was built. About 70 per cent of all the school buildings were of ordinary combustible construction. It is believed this proportion to be typical of that existing in many other cities throughout the country.

As a result of the survey, Providence made many immediate improvements in its schools. Money was appropriated and complete automatic sprinkler protection was installed.

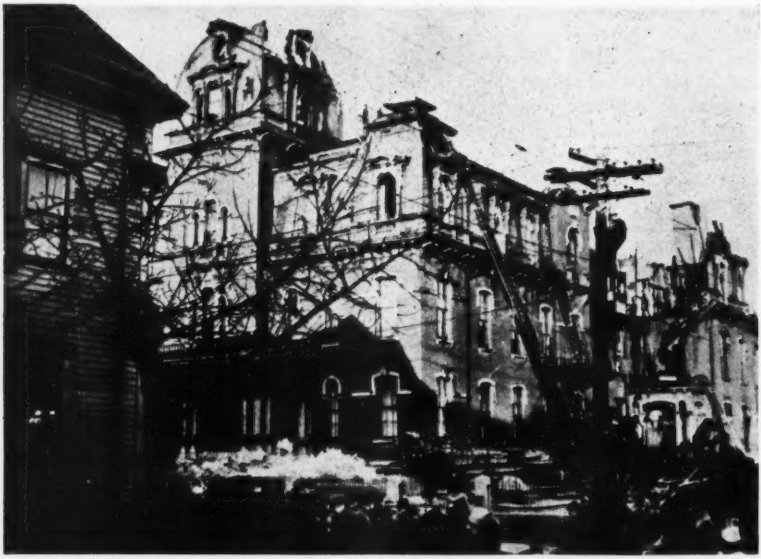
Automatic sprinkler protection has proved to be the primary and most effective means of preventing loss of life. It is therefore logical that the installation of sprinklers should be of the first importance and the immediate provision of such protection is urgent. According to the N.F.P.A. Department of Fire Record, sprinklers have controlled 92.4 per cent of all school fires in which they operated, and obviously this is a conservative estimate of the efficiency of sprinklers in school fires. Small fires are frequently extinguished through the operation of one or two sprinkler heads, and because they are not reported to the N.F.P.A. as there is no loss, cannot be included in the sprinkler efficiency tables. Could all of the fires controlled by sprinklers be included in the records, the satisfactory performance of sprinklers in school fires would be nearer 100.0 per cent.



Automatic sprinklers proved their value in Providence schools when they opened and held in check this school fire until arrival of the fire department.



Ruins of the Point Street School assembly hall after the fire in 1940. After this fire automatic sprinkler systems and other fire-safety improvements were installed in Providence public schools.



Lack of automatic sprinklers and inadequate fire protection led to the costly fire which destroyed this 66-year-old, fire-hazardous Point Street School, Providence.

The effectiveness of this sprinkler protection was demonstrated recently when fires occurred in two of the sprinkler-protected schools, both similar in construction to the Point Street School. A gas range in the second-story Teachers' Room of the Grove Street School was the probable cause of one fire. It spread from wood sheathing of the wall to the wood lath and studs, igniting the hardwood floor. There were two sprinklers in the room, one of which opened and held the fire in check until the fire department arrived.

Fire started at the Trade School, probably from a cigarette butt thrown into a wicker basket containing waste paper towels, and spread to a toilet partition of wood sheathing. Two sprinklers opened and confined the fire. The fire department was called and completed extinguishment with first aid equipment.

In both cases sprinklers had proved their value, and the damage was nominal. As the schools were unoccupied when fire broke out, total destruction of both buildings was likely without this protection.

Although attention has been focused on fire-safety in schools at infrequent intervals due to tragedies like the Collingswood, Ohio, school fire of 1908, in which 175 lives were lost, and the New London, Texas, school fire, the general public is all too unaware of the risks children are subjected to each day in inadequately designed or protected schools. It is true that school buildings are occupied only a relatively small part of the day, but this is no excuse for insufficient fire protection. Communities will do well to make improvements similar to those adopted by the Providence Public Schools without the impetus of a costly fire. Remember that it is children's lives that may be menaced.

Plans for new buildings should incorporate total fire-resistant construction. If combustible construction must be used, buildings of a single story are preferable, and if more than one story, stairways should be ample and suitably enclosed. Heating plants should always be completely cut off with fire walls. Fire alarm signal systems and regular fire exit drills are essential.

Tests on Large Magnesium Fires.

National Board of Fire Underwriters.

The control of magnesium fires continues to present a serious problem, and with all indications pointing towards an increase in the use of magnesium, fire fighting forces are increasingly concerned with the most effective techniques for handling fires involving magnesium. N.F.P.A. members have been informed of all significant developments in this field through the publication of the article entitled "Magnesium and Its Alloys" in the QUARTERLY for October, 1940 and April, 1941 (pamphlet reprint available), through the article in the April, 1944, QUARTERLY entitled "Fighting Magnesium Fires," and through the report of Tests on Control of Magnesium Fires with Sprinklers issued jointly by the Factory Insurance Association and the National Board of Fire Underwriters and made available to all interested N.F.P.A. members on request, as announced in the November, 1944, News Letter. The conclusions of this previously published data are that while magnesium fires are difficult to control by reason of the fact that water and ordinary extinguishing agents react with magnesium intensifying the fire and in some instances causing explosions, it is entirely practicable to control small magnesium fires with special extinguishing powders developed for the purpose, and that in the case of larger magnesium fires, water, properly applied, can be successfully used for extinguishment even though the immediate effect of the first application of water may be a temporary intensification of the fire.

The latest contribution to information on this subject is presented in a report on Tests on the Control of Large Magnesium Fires sponsored jointly by the National Board of Fire Underwriters and the International Association of Fire Chiefs. These tests were conducted at the plant of the Dow Chemical Company in Midland, Mich., and at Grand Rapids at the time of the meeting of the fire chiefs in August, 1944. The following account of these tests has been abstracted from the report published by the National Board of Fire Underwriters in December, 1944.

The Midland Tests.

Test 1.

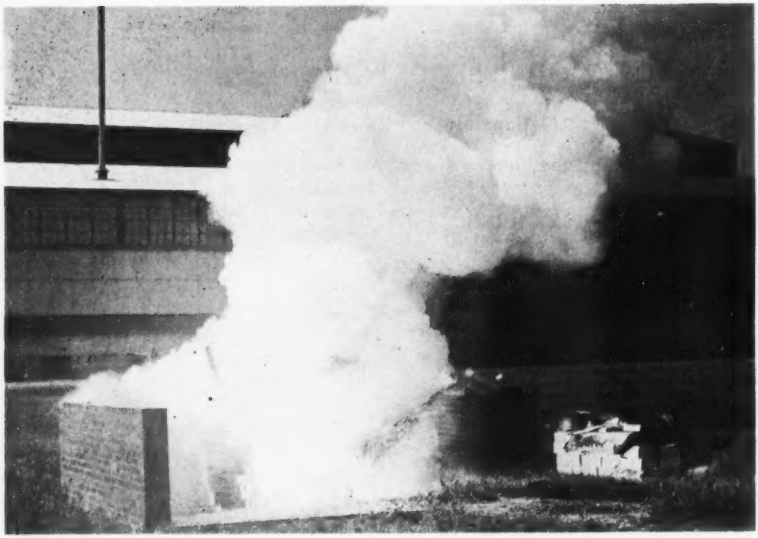
Test 1 consisted of extinguishing a fire involving approximately 1000 pounds of magnesium castings, tubing and turnings placed on a concrete floor walled in on two sides by brick walls.

The fire was started with excelsior and magnesium sawdust and shavings piled at one end. After ignition, the pile was permitted to burn ten minutes, at which time about one-third of the castings were involved by fire, and molten magnesium was flowing from them.

The fire was attacked with G-1 powder, a powder especially developed for magnesium fires, and consisting of finely divided graphite together with an inert organic phosphate. The powder was delivered on the fire with a power-driven applicator which had a capacity of approximately 120 pounds of powder per minute. The unit carried 630 pounds of powder. Six and a half drums of powder, weighing approximately 350 pounds each, were used, giving a total application of 2275 pounds of powder.

At the time the powder was first applied the fire was burning briskly, and particles of molten magnesium were being thrown about four to eight feet in the air due to the contact of molten magnesium with the new concrete floor. Considerable smoke was produced. After about twelve minutes of powder application some of the large unburned castings were pulled from the fire and the fire was stirred. It took approximately seventeen minutes before the fire was fully under control. Even at this time small surface fires remained and some burning underneath was noted the next day.

COMMENT. The powder was applied without danger and effectively brought the fire under control. Extinguishment of this



Test 1 before application of extinguishing powder.

kind of fire with powder is not complete unless the magnesium and powder are worked over with shovels and hooks to obtain complete contact coverage.

The effective use of the powder applicator to a sizeable magnesium fire requires (1) an applicator within reach and in serviceable condition, (2) a suitable electric power supply for the applicator, (3) a plentiful supply of powder at the fire site, and (4) a crew of men familiar with the operation and use of the equipment.

Magnesium fire extinguishing powders are excellent for plant protection purposes, and the power applicator is especially valuable for application of the powder to magnesium fires involving melting pots and ovens. Magnesium fire extinguishing powders should be used wherever they can be used effectively, but it is evident that such powders have various limitations.

Test 2.

Test 2 consisted of attacking a pot of molten metal with a stream of water. The purpose of this test was to illustrate the hazard involved when a heavy stream of water is thrown into a large quantity of molten magnesium. The melting pot contained 700 pounds of molten magnesium heated to a temperature of 1552 degrees F., which is approximately 400 degrees above the melting point.

A 1⅛-inch nozzle with hose line connected was attached to a framework of pipe, so located and adjusted that as pressure was built up at the nozzle, the stream could be made to fall into the pot of magnesium. The nozzle was left unattended.

On an initial attempt the stream struck the pot off center, causing a shower of sparks but no explosion. When the stream was projected squarely on the molten magnesium, particles of molten magnesium were scattered over a radius of about fifty feet, and a large cloud of steam and smoke shot high into the air, with a secondary expansion horizontally some twenty or thirty feet above the pot. The explosion was sharp and would have lifted the roof of a building if occurring indoors.

COMMENT. It is well known that it is dangerous to apply a hose stream into a pot of molten metal of any kind, or for that matter to a pot of any molten material heated to a temperature above the boiling point of water. The result to be expected is a violent eruption of the pot contents due to the sudden transformation of water, that gets beneath the liquid surface, into steam, with tremendous expansive force.

When water is driven beneath the surface of molten magnesium the same reaction takes place; in addition, some of the water or steam reacts with the molten magnesium, producing hydrogen gas.

In some other tests sprinkler discharge on a pot of molten magnesium and hose stream operation directed at or near such a pot have not produced an explosion of the type which occurred in this test, but it may be noted that in this as in a previous similar test it took several tries to get a stream discharge on the molten magnesium that would produce a violent explosion. There is no present reason to believe that discharge into the pot, of water in the form of a spray as from sprinklers, would produce this result.

Test 3.

In this test, approximately 1500 pounds of magnesium castings, tubing and some shavings were placed on a 4- by 8-foot plank platform, with one rear and one side wall extending upward approximately four feet.

The pile was ignited by use of excelsior and magnesium shavings and permitted to burn for twenty minutes before the application of water. At the time of water application, the castings and tubing were well involved, and approximately a third of the pile had been consumed by fire.

Three fire streams were used, each from a 1⅛-inch nozzle. The nozzles were operated from a point approximately sixty feet from the fire. Nozzle pressures were around forty-five pounds per square inch. The hose lines were 400 feet in length, and a pump pressure of approximately 100 pounds was maintained.

The first stream was started and directed at the heart of the fire, followed by a second stream one minute later, and a third stream thirty seconds later. There were several exposions, three of which were fairly severe. The most severe explosion scattered the castings and blew the side and end walls from the platform. Some light pieces of tubing were thrown about thirty feet. The explosions also threw showers of particles of molten magnesium within a short range of the fire. The fire was completely extinguished in three and a half minutes.

COMMENT. The heavy concentration of water from three good streams directed at the center of the fire quickly extinguished the fire, although producing several explosions, at least one of which was judged to be of sufficient intensity to do structural damage if in a building.

This method of extinguishment may be applicable in some cases, but due consideration must be given to the danger to life from explosions which may occur when a heavy stream hits a quantity of molten magnesium.

Test 4.

In this test, 1500 pounds of magnesium castings were used in a set-up similar in all respects to that used in Test 3, and the pile was ignited in a similar way. The fire was allowed to burn for ten minutes, at which time approximately a fifth of the pile had

Test 1 during application of extinguishing powder.

been consumed and the fire had reached a vigorous stage.

One stream of water was used on this fire, from a 1⅛-inch nozzle at approximately forty-five pounds pressure. One hundred pounds was maintained at the pumper, and line was 400 feet in length.

The object of this test was to determine the effectiveness of operating the stream on the unburned portions of the pile and gradually working toward the fire, thus cooling the magnesium castings and tubing and gradually bringing the fire under control.

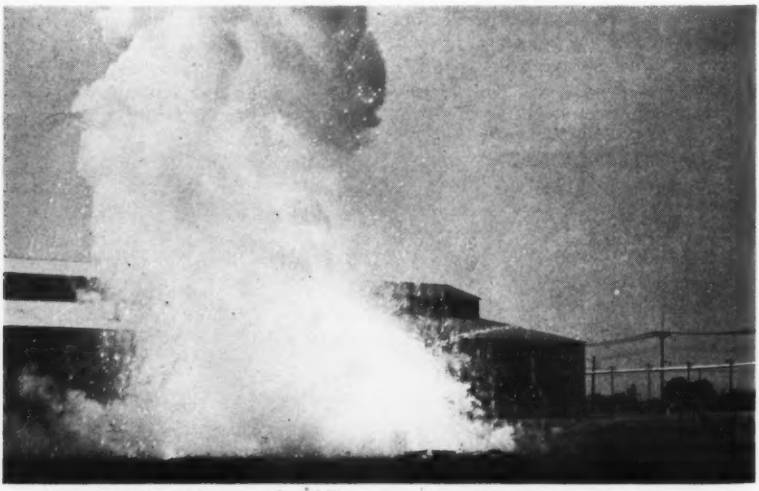
After applying water on the unburnt portions of the pile for a little over two minutes, the stream was gradually directed to the heart of the fire; the fire had been reduced materially in the interim. At 4½ minutes it was blackened on the surface, with only a little fire showing. At five minutes it was apparently out, although close inspection showed some of the small castings were still afire beneath the pile. These were completely extinguished by 5½ minutes. Some flashes occurred, but no explosions.

COMMENT. That this test fire was extinguished with one hose stream of the same character as those used in the previous test but without any explosion, may have been due to two facts: (1) In size and intensity at time of attack this fire was smaller than the fire of the previous test, and (2) the hose stream was applied carefully around the heart of the fire until the fire was much subdued.

The performance in this test indicates that under certain conditions water from hose streams can be effectively used to extinguish magnesium fires involving castings and tubing without danger of explosion. This is particularly true if the fire is attacked before much molten magnesium has formed, or in such a way as to avoid contact of water in quantity with a sizeable amount of molten magnesium.

Test 5.

The set-up for this test was arranged by adding new magnesium, including some moist magnesium turnings, to that which remained from Test 4. The platform and ground beneath were water-soaked from the previous test and with puddles of water standing underneath and in front. This test was to demonstrate the effectiveness of fog or spray nozzles on magnesium fires. Two nozzles were employed, one creating a fine spray with a maximum reach of about eighteen feet, the other a more concentrated stream in the form of a coarser spray having a reach of



Test 2. Explosion when the hose stream landed squarely on the pot of molten magnesium.

thirty-five to forty feet. The fire was allowed to burn ten minutes before the spray nozzles were put in operation.

At the start, minor blasts or explosions were produced, with some spattering of burning particles. As the extinguishing operations progressed, these became more vigorous. After approximately six minutes of operation, there was a succession of minor blasts. The front of the fire was fairly well darkened, but the rear still showed plenty of fire, when, without warning, at nine minutes, a violent explosion occurred.

Test 5. This shows a minor explosion during application of spray streams.

In this explosion the magnesium castings and tubing were all thrown into the air, landing in widely scattered locations, and the floor and wall planks of the set, though anchored together, were blown apart and clear of the site of the test. The heavier castings, weighing forty to sixty pounds, landed at distances up to 275 feet away. Practically none of the articles landed within a radius of twenty feet. The floor planks, which had been charred on the upper surface, were broken upward. Due to the roughness of the ground there was a puddle of water up to three inches deep, as well as an inch or more of air space under some of the platform.

COMMENT. This fire developed more rapidly than the fires of the previous two tests due to the wetness of the magnesium and platform from the previous test and addition of moistened magnesium shavings for quicker ignition. It is possible also that the fire spread more rapidly to the rear of the pile than in the previous test due to the way in which the shavings were located in the pile. Another factor was that due to the character of the streams and the hesitancy with which the men on the hose approached the fire, very little water from the smaller spray nozzle reached the magnesium and little water from the larger spray stream reached the center or back of the pile.

Under these conditions the fire became subdued in front, but burned unhindered at the rear, and there developed without much doubt a puddle of molten magnesium which, when it fell or burned through the plank platform, dropped into the puddle of water on the ground underneath, causing the explosion.

This explosion was unquestionably of such a nature as would be capable of doing structural damage if in a building. The conditions necessary to produce a similar result appear to be a sizeable amount of molten magnesium brought in contact with a quantity of water in a situation where objects capable of becoming missiles are in close proximity to the center of the explosion.

An obvious disadvantage in the use of spray nozzles on sizeable magnesium fires is the closeness with which the fire must be approached and the lack of penetration of any spray stream.

Test 6.

Test 6 was a demonstration to show the characteristic burning of wetted magnesium chips. Three 55-gallon metal drums of wetted chips were ignited and permitted to burn to complete destruction. After a few minutes of quiet burning, showers of sparks issued from the drums with large bursts of flame.

It took approximately twenty minutes for the magnesium in the three drums to burn. Ash remained incandescent for an hour or more.

COMMENT. Burning of open top drums of wet magnesium shavings is attended with eruptions of showers of sparks in a rather spectacular display. Such sparks could readily ignite surrounding combustible material, including any finely divided magnesium, but the eruptions do not have any explosive force.

Test 7.

The purpose of Test 7 was to determine the effectiveness of water streams played on drums containing magnesium wastes in preventing the fire from communicating from one drum to another.

As shown in the sketch, ten drums of shavings, chips, sawdust, etc., some dry and some oily, six drums sealed with metal covers and the other four open, were included in the test. Each drum was about seven-eighths full of magnesium shavings, sawdust, or borings.

Fire was started in a pile of approximately 300 pounds of magnesium castings and chips placed in contact with the first row of four of the ten drums. The fire was allowed to burn ten minutes before water was applied.

Two hose lines were used, with engine pressure at 100 pounds and nozzle pressure approximately forty pounds at each of the 1⅛-inch nozzles.

The fire alongside of the drums was attacked with one stream directed so as to drive the castings away from the drums. This was accomplished, and the hose stream extinguished the fire in approximately two and one-half minutes. During this process there were upward bursts of burning magnesium particles which ignited the magnesium in the open drums. Two streams were then directed at the drums. Discharge of water into the open drums was avoided, but occasionally some water did get thrown into them, causing eruptions of showers of sparks with bursts of flame. After the fire had burned approximately half an hour, one of the drums blew its lid. The streams were continued on the drums for approximately forty-five minutes, when it was determined the fire would spread no further.

Subsequent investigation of the drums showed the following:

Drum No. 1—Top blown open and contents burned.

Drum No. 2—Completely burned out, without blowing of top. The cover of the drum had two small holes in it, but these appeared to have no bearing on the result. The contents of this drum had been reduced to ash which consisted largely of magnesium nitride. Some of the nitride was taken from the drum and placed on a metal lid and, after a few minutes, started burning. When placed on wet ground it burst into flame almost instantly. The smell of ammonia was noticeable in both cases.

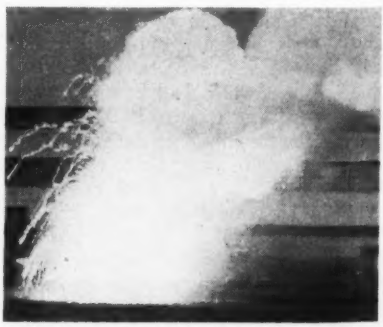
Drum No. 3—Contents completely burned.

Drum No. 4—Contents completely burned.

Drum No. 5—When the cover of this drum was opened, there was a two-inch fringe of oxide and nitride to a depth of ten to twelve inches. There was a characteristic ammonia odor to the contents.

Drum No. 6—Contents completely burned.

Drum No. 7—This drum, which contained some paper, wire, etc., together



Test 6. Wet magnesium chips burning in a steel drum.

with the shavings and sawdust, showed no damage.

Drum No. 8—Contents not burned. There was some two to ten inches separation of this drum from drums that burned.

Drum No. 9—Contents completely burned.

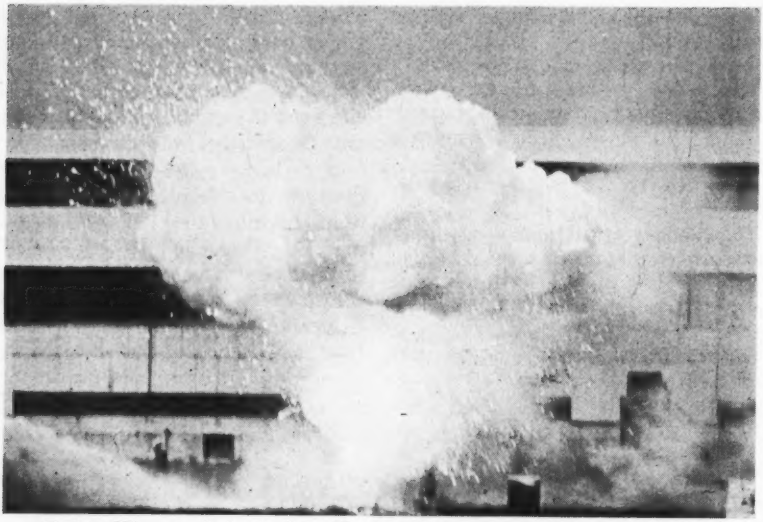
Drum No. 10—No evidence of oxidation or burning.

The contents of all four open drums were completely burned. Of the six sealed drums two had contents destroyed, one partly so, and three were saved from damage.

COMMENT. This test indicates that there is decided value in having fine magnesium scrap in tightly covered drums; a few inches separation between drums is advantageous. Where the drums are thus sealed, hose streams can be used safely and effectively in keeping drums cool and stopping the spread of fire from drum to drum.

If the scrap magnesium in the sealed drums is dry, there is no danger of the drums bursting or exploding, as the burning of the magnesium in such case tends to produce a vacuum in the drum rather than any pressure. If the scrap is oily, sufficient internal pressure may be created from vaporization of the oil to blow off the cover or otherwise open the drum, but

Test 7. This diagram shows the layout of drums of magnesium chips and contents of each drum.



Test 7. Minor explosion in drum No. 1 when pressure of oil vapors blew the drum cover open.

if kept cool with water this can be prevented.

Fire involving an open drum of scrap cannot be extinguished with hose streams; water striking the burning scrap will cause eruptions of showers of burning particles which would serve to spread the fire.

Magnesium burning in a tightly sealed drum unites with the oxygen of the air in the drum to form magnesium oxide, and when the oxygen is mostly used up unites with the remaining nitrogen to form magnesium nitride. As both the oxide and the nitride are solids, it is evident how the burning tends to create a vacuum. The nitride formed in a sealed drum, being spontaneously flammable, must be handled with care to avoid further fire.

The shipping or storage of magnesium scrap in burlap bags should not be allowed.

The Grand Rapids Tests.

Test A.

In this test a pile of about 1000 pounds of magnesium castings and shapes, together with a quantity of turnings, was used. This was placed on a wood platform set on a leveled sand base so as to avoid air spaces under the platform. It was ignited and allowed to burn until well involved, with considerable molten metal.

The fire was attacked with G-1 powder delivered on the fire with a power-driven applicator, the same as used in Test 1 at Midland, with the exception that the nozzle pipe was considerably longer. With the assistance of a long-handled shovel to assist in obtaining complete coverage of burning magnesium with the powder, and of two long-handled hooks to remove unburned castings, the fire was extinguished with about 600 pounds of powder.

COMMENT. The extinguishment of this fire with much less powder than the fire of Test 1 at Midland was due to a considerable extent to the longer nozzle pipe which permitted delivery of the powder close to the seat of the fire. Location on a dry wood platform rather than on new concrete, and somewhat less wind were other factors.

Test B.

In this test a pile of about 200 pounds of magnesium castings and turnings was permitted to burn until well involved. The fire was attacked by throwing 5-pound paper bags of G-1 powder at the fire, thus permitting the powder to settle and spread on the fire as the bags burned. Some minor spattering of molten magnesium occurred during application of the powder. In this manner and with the assist-

ance of a shovel and a hook as in Test A, the fire was extinguished with about 250 pounds of powder.

COMMENT. The effective application of the powder by this method was facilitated by the fact that the fire was out in the open with no walls to confine the heat, and with no obstructions to visibility, thus permitting accurate aiming of the bags of powder.

Test C.

In this test 1500 pounds of heavy and light castings and extrusions were placed in a row about fifteen feet long, three feet wide and two to three feet high, located on a wood platform set flat on the ground. Excelsior and magnesium chips were used to start the fire at one end, and the material was permitted to burn until about four feet of the pile was well involved, resulting in the formation of considerable molten magnesium.

Water from a 1⅛-inch nozzle, using 400 feet of hose and 100 to 120 pounds at the pump was used to thoroughly wet down the unburned magnesium. The stream was started at the end away from the fire and slowly moved until the edge of the stream was in contact with the burning magnesium, and was then held at this point until the fire had burned itself out. Essentially all of the four feet of magnesium involved melted and burned, but there was no explosion, nor any heavy discharge of sparks. The application of one hose stream effectively stopped the spread of fire.

COMMENT. This test is comparable in result to Test 4 at Midland and adds further substantiation to the conclusion that under certain conditions water from hose streams can be effectively used to extinguish magnesium fires without danger of explosions.

Conclusions.

A study of the data available to date from tests and actual fires points to the following general conclusions regarding fires involving a quantity of magnesium:

When magnesium in its solid forms is ignited it melts as it burns, and after some minutes of burning produces puddles of molten magnesium, which present the fire and explosion hazards associated with other hot molten metals, increased by magnesium's greater affinity (hunger) for oxygen.

When a sizeable amount of molten magnesium is brought in contact with a mass of water, or vice versa, an explosion

Test A at Grand Rapids. This shows how closely a dry magnesium fire can be approached.

results. In using hose streams in fighting building fires where magnesium in solid form is involved such contact between molten magnesium and water may be possible, and if occurring, the resulting explosion may be severe.

Such explosions may be avoided to the extent that it may be possible to keep molten magnesium from forming sizeable puddles, or to the extent that it may be possible to keep masses of water and of molten magnesium from coming in contact. Available data indicate that under automatic sprinkler protection the amount of molten magnesium formed will be much reduced, and the sooner the fire is attacked the less molten magnesium will have had time to form. Accumulations of water on the floor or ground under burning magnesium would increase the explosion hazard from dropping molten magnesium.

The severity of any resulting explosion may be lessened by providing as much vent area as possible, as by opening windows, doors and skylights and by opening up roofs if necessary.

Before attacking a large magnesium fire with hose streams the situation should be sized up carefully. The amounts and kinds of magnesium, the conditions of storage, the building construction, the character of exposures, as well as the character and extent of the fire will be among the factors to be considered in deciding upon a course of action to bring the fire under control.

Some lessons of a general nature which these tests emphasize with respect to premises where magnesium in quantity in solid form is stored or handled, are the following:

a. Extreme cleanliness and orderly condition of premises are needed at all times.

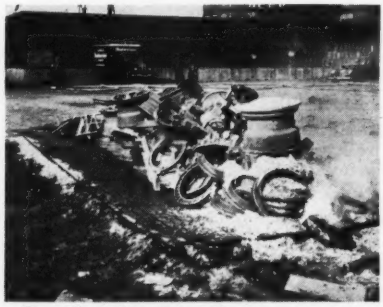
b. Waste magnesium products should be collected as they are produced and promptly removed in tightly covered containers from manufacturing buildings to a detached location.

c. Materials more easily ignited than magnesium should be kept to a minimum in all places where their burning could result in ignition of magnesium.

d. Stocks of magnesium in the more easily ignitible forms, such as turnings, chips and sawings, should be kept well separated from stocks of magnesium in forms less easily ignited.

e. The amount of magnesium in any stock or pile should be kept to a minimum, with clear aisles of ample width between.

f. The total quantity of magnesium in any one fire section should be limited by a consideration of values and of exposure



Test C at Grand Rapids. Layout of material at start of fire.

hazard to surrounding buildings, on the assumption of possible total destruction of all the magnesium in the section.

g. Where magnesium is stored or handled in buildings of combustible floor construction, there appears to be need for the development of floor covering materials which would prevent molten magnesium from burning through the floor.

h. Floors should be provided with adequate drainage facilities to avoid accumulation of water on the floor around stocks of magnesium, from automatic sprinklers or hose streams.

i. Buildings should be provided with good exit facilities, and with large window or skylight area to provide for explosion relief.

j. Supplies of extinguishing agents which are chemically inert to burning magnesium should be kept quickly available at all locations where machining or other mechanical operations on magnesium are performed, also where magnesium is heated or melted or is kept in a form or under conditions which permit of easy ignition.

k. Fires in magnesium in its solid forms where no water is present or has been used may be approached closely without danger, permitting ready removal of unburned magnesium.

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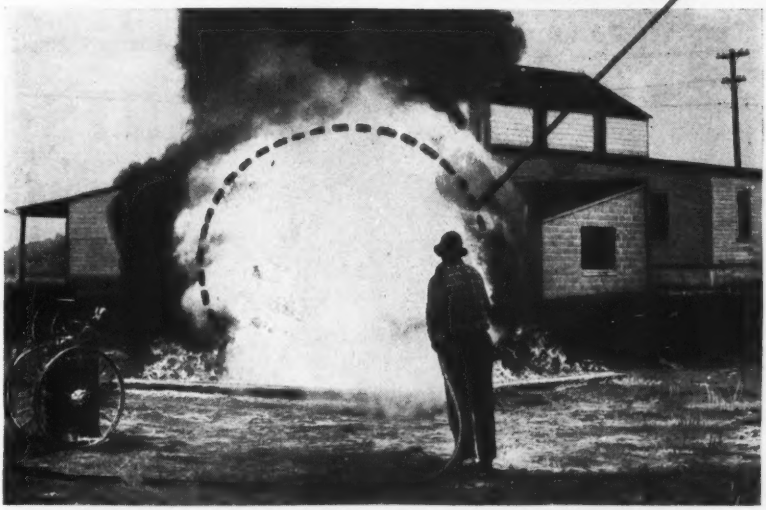

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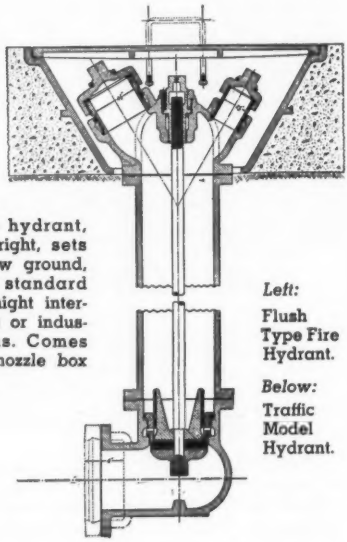

Flush type fire hydrant, illustrated at right, sets completely below ground, is used where standard type hydrant might interfere with traffic or industrial operations. Comes with cast iron nozzle box and cover.

Left: Flush Type Fire Hydrant.

Below: Traffic Model Hydrant.

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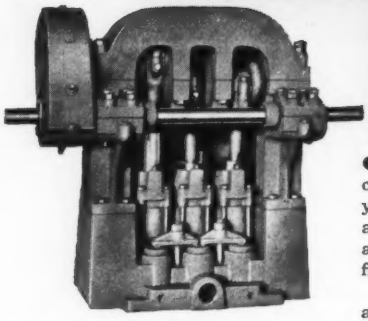

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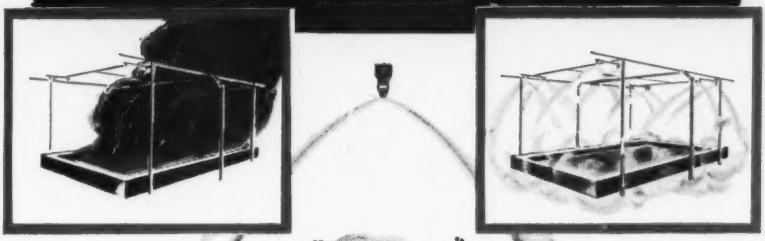

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* IT BLANKETS * IT ISOLATES * IT QUENCHES *

● Would FIRE-FOG prove effective in quenching oil fires? What better way to answer than to make an actual fire test?

A test-tank 5′6″ x 9′ was partially filled with fuel oil, a quart of gasoline used to set off the fire, and in 20 seconds the entire area was ablaze. It was permitted to burn for one minute and thirty seconds.

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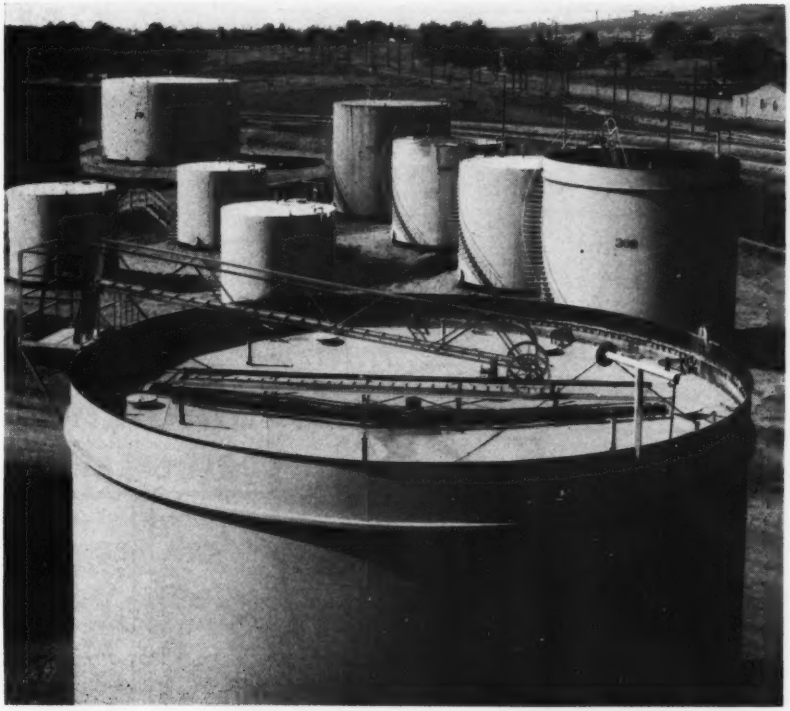

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The Wiggins Pontoon Roof rides directly on the liquid in an oil storage tank, blanketing the surface at all times except when the tank is practically empty. The liquid under the roof cannot become ignited as there is no oxygen present to permit combustion. The elimination of a large vapor space above the liquid also removes the possibility of having an explosive air-vapor mixture when a drop in temperature or withdrawal of tank contents causes air to be drawn in through the vents. Wiggins Pontoon Roofs may be installed on new or existing tanks 15 ft. in diam. and larger.

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Drycleaners using Hoffman 140-F Safety Petroleum Solvent Drycleaning Systems are still able to continue their legitimate operations—using 140-F Class III machinery with listed high flash petroleum solvents. Unlike users of some other types of machinery they have not been compelled by war shortages to use these solvents in equipment not designed for petroleum solvent operation.

U. S. HOFFMAN MACHINERY CORPORATION
105 Fourth Ave., New York 3, N.Y.
DRY CLEANING, LAUNDRY & GARMENT PRESSING EQUIPMENT

A RECORD THAT'S HARD TO BEAT

It's the reason for the trend to Pyranol transformers

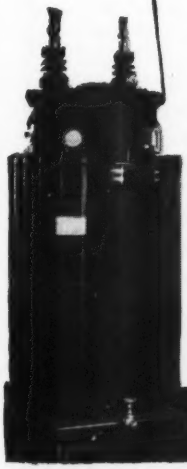
1. OPERATING RECORD 99.8 PER-CENT PERFECT—based on careful records of 12,000 Pyranol* transformers, totaling 2,000,000 kva, installed from 1932 to 1943 in *industrial plants*. In this ten-year period there have been *only* 23 failures.

2. NEVER A FAILURE DUE TO PYRANOL. In *not one* of these 23 failures reported during this ten-year period, did the fact that the cooling liquid was Pyranol have anything to do with the failure. Furthermore, in not one of these 23 cases was anyone harmfully affected physically.

3. NEVER A FIRE WITH PYRANOL. In *no case* has Pyranol burned or contributed to a fire. In *no case* has its vapors formed explosive mixtures with the air. The National Electrical Code permits the use of Pyranol transformers indoors *without* the use of fireproof vaults.

*Reg. U.S. Pat. Off.

No vaults required. You can place the transformer next to the load it is to serve.
Filtering of Pyranol is seldom, if ever, required.
Periodic blowing out of dust is, of course, unnecessary.



Can you ignore the economic benefits of this time-proved product?

Why should you accept anything short of the greatest reliability, for your power supply? Can you afford unnecessary capital investment in such items as vaults and heavy copper, necessary when oil-filled transformers are used for industrial distribution? Can you afford to have your transformers exposed to dirt, dust, or oil vapors? Can you afford to ignore an operating record such as Pyranol transformers have produced?

For safety, savings, and reliability, specify Pyranol for your next indoor installation of transformers or load-center unit substations. Pyranol units are available for circuits up to 69,000 volts—our new bulletin, GEA-4193, will bring you additional facts. General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

FIRE!

ENEMY No. 1 ON THE HOME FRONT!

STAR Automatic Sprinklers "BACK THE ATTACK" by guaranteeing uninterrupted war production and preserving the "WEAPONS OF WAR" stored for Invasion!

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Open Sprinklers
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Automatic Releases
Alarm Valve (Wet) Systems
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Deluge Systems
Heat-Actuating Devices
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Star Automatic Sprinklers and Fire Protection Devices bear approval of all Insurance Authorities having jurisdiction and various Governmental Agencies

Economy in installation cost and maintenance has dictated the consistent policy of Star Sprinkler Corporation in distributing its Fire Protection Devices through local licensed contractors who have had a lifetime of experience in the installation of automatic sprinkler systems. Operating throughout the United States, Canada and South America, Star licensees, due to their strategic locations, can render instant service. Write us for name and address of Star licensed contractor nearest your location.

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C-D/Fog is dependable — quality mass produced for essential users by General Detroit, famous for over forty years of fire protection. Coupon below will speed details. Mail it now!

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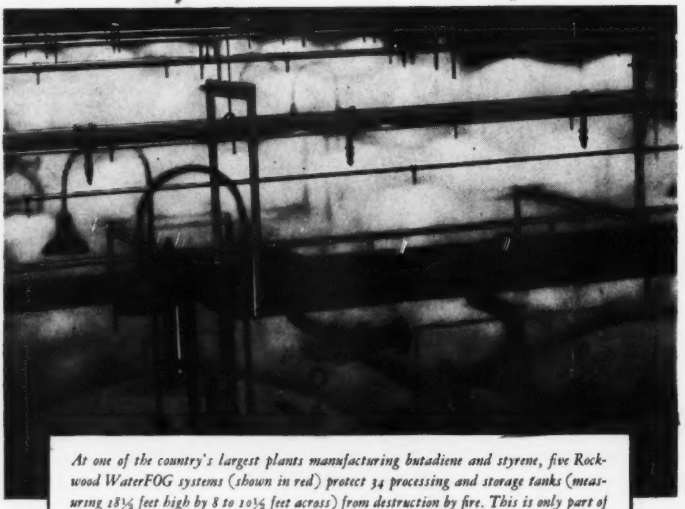

At one of the country's largest plants manufacturing butadiene and styrene, five Rockwood WaterFOG systems (shown in red) protect 34 processing and storage tanks (measuring 18¼ feet high by 8 to 10¼ feet across) from destruction by fire. This is only part of a complete fire protection system protecting tank areas in this plant.

Rockwood WaterFOG strips flammable vapors of their threat

Any leaks of highly flammable vapors from these tremendous processing and storage tanks would create a threat of wiping out — by fire — a major source of critically-needed synthetic rubber. Helping to protect this important plant are installations — at vulnerable points — of Rockwood WaterFOG.

Should a fire start, the release of WaterFOG would flood the area with an ocean of tiny water particles which would rapidly absorb the heat of the flames, controlling and confining the fire and cooling the metal structures to prevent distortion or even destruction by heat.

The WaterFOG systems may be operated simultaneously, separately, or in any combination. A WaterFOG curtain between every other row of tanks, goes into action whenever the system on either side starts operating. Thus, adequate protection is provided over, around and under every tank.

WaterFOG — created by impinging streams of water from Rockwood nozzles — is effective on flammable liquid or vapor fires where spray and solid streams are frequently unsafe. It absorbs heat faster, retards vaporization, doesn't splash. Both Underwriters' Laboratories and Associated Factory Mutuals approve Rockwood WaterFOG installations of fixed piping. WaterFOG nozzles for hose lines also available. Write for Bulletin 123.

ROCKWOOD SPRINKLER COMPANY

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The First Few Minutes!

The first few minutes at the start of a fire are worth hours of fire fighting later. What happens during this critical period often determines the safety of human life . . . the fate of a thriving business.

These first few minutes determine whether a successful enterprise will continue its uninterrupted progress or be seriously crippled, perhaps destroyed entirely, by fire. Such fires curtail vital war production, destroy critical war materials. And the nation can ill afford such losses in its all-out effort to hasten victory.

Dependable, automatic, Grinnell Sprinklers will detect and put out a fire in those first few minutes . . . before any major damage can occur. They have extinguished over 8000 fires in the past ten years alone. There is a type of Grinnell System for every fire hazard. Complete information is available for the asking from any of our offices throughout the country. Grinnell Company, Inc., Providence 1, R. I.

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